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Uncompahgre and  
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Forests  
Gunnison Ranger  
District



# **Cochetopa Hills Vegetation Management Project**

## **Environmental Assessment**

## **Saguache County, Colorado**



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## 1. PROPOSED ACTION/PURPOSE OF AND NEED FOR ACTION

### 1.1. Introduction

The U.S. Forest Service is planning vegetation management activities in the Cochetopa Hills area of the Gunnison Ranger District of the Grand Mesa, Uncompahgre and Gunnison National Forests.

The Gunnison Ranger District has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that are expected to result from the proposed action and alternatives to the proposed action. The analysis documented in the EA is tiered to the Forest Plan. It does not reanalyze management area allocations already specified in the Forest Plan, nor does it seek to reexamine Federal regulations or Forest Service policy regarding timber harvest on National Forest lands. An additional comment period was offered in accordance with 36 CFR 218. The Notice of Comment was initiated on August 8, 2013 and closed on September 7, 2013. The Responsible Official will decide which actions, if any, to implement. Once a decision has been reached, a Legal Notice of Decision will be published in the Gunnison Country Times newspaper.

The document is organized into six chapters:

Chapter 1 – Proposed Action/Purpose of and Need for Action: Chapter 1 includes information related to the background of the project proposal, the purpose of and need for the project, and a general description of the Forest Service’s proposal for achieving that purpose and need. This chapter describes how the Agency informed the public of the proposal (scoping) and how the public responded. Issues and concerns identified through internal and external scoping were used to identify *key issues* which are presented in the chapter.

Chapter 2 – Alternatives: Chapter 2 provides a more detailed description of the proposed action and alternative methods for achieving the stated purpose. The Forest Service developed these alternatives based on key issues raised by public comments, by other agencies, and internally. This section also includes summary tables displaying the activities planned by alternatives and a comparison of the alternatives’ response to the key issues.

Chapter 3 – Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing each alternative. The analysis is organized by resource area (Fire and Fuels, Recreation and Travel Management, Wildlife, Hydrology and Soils, etc.).

Chapter 4 – Literature Cited: This chapter provides the citations for all supporting references used within the EA document.

Chapter 5 – List of Preparers: This chapter provides information on those who conducted the analysis documented in this EA.

Chapter 6 – Agencies and Persons Consulted: This Chapter provides a listing of agencies and persons consulted while conducting the analysis provided in the EA.

Chapter 7 – Glossary: This chapter provides a listing of words and acronyms used within the EA document.

Appendices: The appendices provide more detailed information to support the documentation and analysis presented in the EA. Additional documentation, including more detailed analyses of project area resources, may be found in the project file located at the Gunnison Ranger District office in Gunnison, Colorado.

## 1.2. Background

The wide variety of forest types within the Cochetopa Hills makes this area unique. Spanning 61,252 acres, the Cochetopa Hills planning area includes seven major forested cover types (aspen, lodgepole pine, spruce-fir, cool moist mixed conifer, ponderosa pine, Douglas-fir and bristlecone pine), as well as a large component of open parks and meadows. The diverse landscapes within the area make it a suitable home to a variety of wildlife, including deer, elk, pronghorn, and goshawks. Habitat linkage areas for the Canada Lynx, which is listed as a “Threatened” species under the Endangered Species Act, have also been identified within the area.

The Cochetopa Hills is dependent on disturbance events such as wildfire to maintain tree regeneration and create age class diversity within stands. However, due to a history of fire suppression, the Cochetopa Hills planning area no longer meets historic conditions of ecological diversity among forest types, creating an imbalance within the landscape and putting forest health in danger. Stands are at risk for bark beetle infestation (including white pine beetle attack), the invasion of white pine blister rust, dwarf mistletoe, and fungal diseases. Damage from high-intensity wildfire is also a concern. Opportunities and needs exist within each vegetative cover type to achieve Forest Plan goals.

A high proportion of the forested stands within the Cochetopa Hills landscape are now made up largely of mature trees with a dense overstory. This overstory blocks sunlight from reaching the forest floor, which in turn creates an environment that favors shade-tolerant species and limits the growth of other plants. Species that require more sun (aspen, lodgepole pine, ponderosa pine and Douglas-fir) are at risk of displacement from more shade tolerant species due to ecological succession. Loss of the aspen species is of particular concern in all its vegetative associations (aspen, spruce-fir/aspen, and cool moist mixed conifer). Silvicultural treatment can be used in these forested cover types to regenerate trees, introduce disturbance and control density levels.

Due to lack of fire, the ponderosa pine and Douglas-fir cover types within the Cochetopa Hills planning area are dense and overstocked. These stands are at the lower elevation zones within the planning area, and have historically experienced a high frequency, low severity, surface fire disturbance regime. Many of these stands will need mechanical fuel reduction treatments before fire can be re-introduced to perform its ecological role on the landscape.

Pure stands of bristlecone pine can also be found within the Cochetopa Hills landscape. However, stands are dense and exhibit a lack of age class diversity. These stands are at risk of bark beetle attack, and the potential invasion of White Pine Blister Rust (WPBR). Silvicultural treatments can be used within the bristlecone pine cover type to decrease stand densities, promote age class diversity and reduce vulnerability to damage from insects and disease.

Forest restoration in the Cochetopa Hills also presents an opportunity for timber harvesting. The majority of the land area within the Cochetopa Hills landscape is identified in the Forest Plan as the “7A - Timber Management on Slopes Under 40 Percent” management area. There has been a long history of timber management and wood product harvesting within the planning area. Within most of the spruce-fir and lodgepole pine forest types, a suitable road system exists to allow the removal of wood products. In these areas, the efficient and economical production of wood products can continue.

The open parks, meadows and riparian areas within the Cochetopa Hills landscape provide wildlife habitat to many species, especially forage for large game animals. Additionally, cattle grazing and range management is an important use. Lack of disturbance has created conditions in the rangelands where forbs and grasses are being displaced by less palatable shrubs and conifer trees. Opportunities exist to use prescribed burning and mechanical treatments to stop conifer encroachment into meadows and stimulate greater production of grasses and forbs within the rangelands of the Cochetopa Hills landscape.

Without active silvicultural management, continued loss of tree species and age class diversity is expected. The landscape will become more susceptible to damage from insects and disease, and overall forest health and diversity is expected to decline. Treatment needs within the Cochetopa Hills planning area have been identified by comparing the desired condition to the existing condition within the landscape. The Forest Service recommends a combination of thinning, restoration, prescribed burns and timber harvesting to maintain forest dynamics. Details of this recommendation as well as alternative actions are explained in this EA.

### 1.3. Proposed Action

The proposed action for vegetation management in the Cochetopa Hills planning area is to use silvicultural treatments to: increase forest age class and species diversity within the landscape; reduce the risk of damaging insect, disease and fire events; provide wood products now and in the future; and enhance range resources. Below is a brief summary the proposed action (Table 1). This proposal and another potential management alternative are presented in more detail in Chapter 2.

Table 1. Activities of the Proposed Action

<b>Treatment</b>	<b>Acres</b>
<b><i>mechanical treatments</i></b>	
Aspen coppice (clear cut)	244
Bristlecone pine thinning	31
Clearcut	144
Fuel break -group selection	184
Fuelbreak - patch cuts	29
Group Selection	3,857
Mistletoe control strip cut	38
Overstory removal	209
Patch cut (old strips)	71
Pine & Douglas-fir thinning (restoration)	745
Pole thinning	121
Poles - clearcut	53
Poles thinning with Aspen patch cuts	27
Shelterwood seed step - Douglas-fir	47
Shelterwood seed step - lodgepole pine	130
Uniform Selection	30
<b>Total</b>	<b>5,960</b>

<b><i>prescribed burn treatments</i></b>	
Low intensity underburn	5,859
Aspen Burn	37
<b>Total</b>	<b>5,896</b>

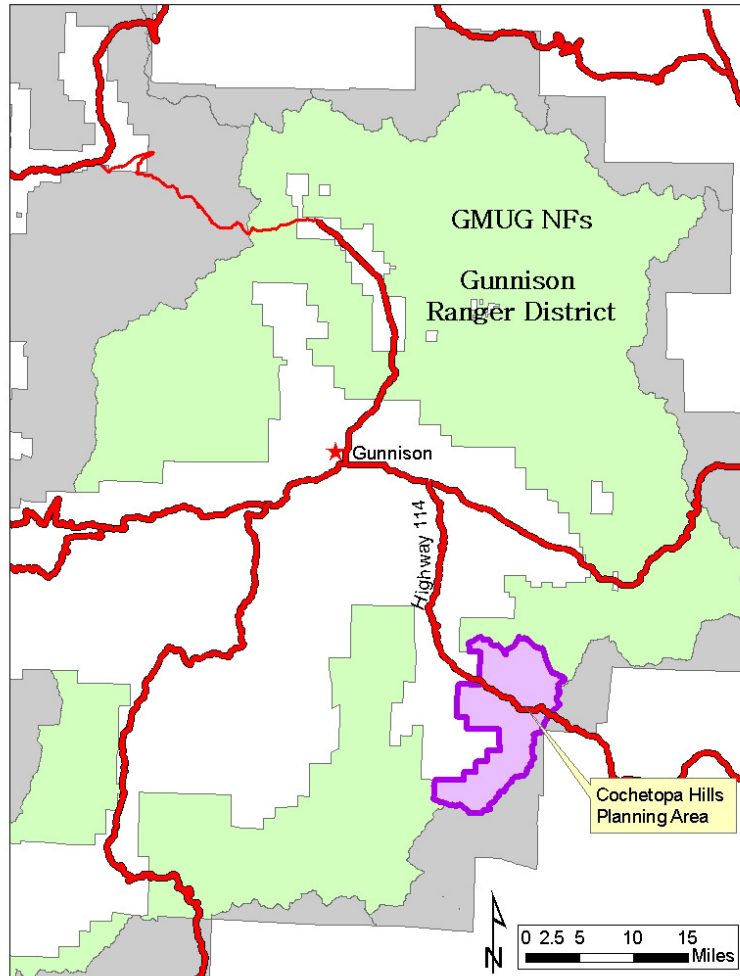
In addition to the silvicultural activities listed above, the proposed action also includes road rerouting (2.5 miles closure, 3.9 mile new reroute), 0.8 mile of new road construction, and the development of a gravel pit.

#### 1.4. Planning Area

The Gunnison District of the Grand Mesa, Uncompahgre and Gunnison National Forests is planning multiple forest vegetation management projects in the Cochetopa Hills portion of the district. The 61,252 acre planning area includes all National Forest lands adjacent to Colorado State Highway 114 and extends north to the Cochetopa Hills Inventoried Roadless Area (IRA) boundary, and south to the Forest

boundary along the continental divide. The eastern boundary follows the ridge between Cochetopa Creek and Razor Creek, and the western boundary extends to the Middle Fork IRA (Figure 1).

Figure 1. Vicinity Map - Cochetopa Hills Planning Area.



Within this broad planning area, the district will evaluate and design commercial and non-commercial forest vegetation treatments to meet the goals of the 1991 Grand Mesa, Uncompahgre and Gunnison National Forests Amended Land and Resource Management Plan (Forest Plan) in areas where it is appropriate.

A large planning area will be used to facilitate a comprehensive, landscape level approach to planning forest vegetation treatments and to increase planning efficiency to better utilize limited agency resources and the public involvement process.

### 1.5. Purpose of and Need for Action

The purpose of the proposed action is to create and maintain a healthy forest and rangeland condition and provide social and economic benefits. This purpose will be accomplished through a combination of restoration, thinning, regeneration and burning treatments. The project is needed in order to: 1) create/maintain forest age class and species diversity within the landscape, 2) protect forests from insects, diseases, and wildfire, 3) provide wood products now and in the future, and 4) protect and enhance range resources.

The Cochetopa Hills Vegetation Management Project is designed to achieve Regional and Forest-wide Objectives identified in Chapter II and III of the Forest Plan. The project objectives and their relationship to specific needs and opportunities are displayed in Table 2.

Table 2. Purpose and Need Elements as Related to Opportunities, Goals and Objectives

Purpose and Need Element	Opportunity, Forest Plan Goals, and Objectives
1. Create/maintain forest age class and species diversity within the landscape	<p>Utilize silvicultural treatments to regenerate trees within the aspen, lodgepole pine, spruce-fir, spruce-fir/aspen, mixed conifer and bristlecone pine forest types. (opportunity)</p> <p>Utilize silvicultural treatments (including prescribed burning) to reduce stand densities and promote large, remnant ponderosa and Douglas-fir tree retention in the dry mixed conifer and ponderosa pine forest type. (opportunity)</p> <p>Increase and improve wildlife habitat diversity. (Forest Plan Goal III-3)</p> <p>Increase and improve vertical and horizontal diversity. (Forest Plan Goal III-3)</p> <p>Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. (SRLA, Objective VEG O1)</p> <p>Provide a mosaic of habitat conditions through time that support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation. (SRLA, Objective VEG O2)</p> <p>Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover (SRLA, Objective VEG O4)</p>
2. Protect forests from insects, diseases, and wildfire	<p>Reduce basal area and increase species diversity in the spruce-fir and lodgepole pine cover types. (opportunity)</p> <p>Maintain species and age class diversity on the landscape. (opportunity)</p> <p>Prevent and control insect and disease infestation. (Forest Plan Goal III-4)</p> <p>Provide a cost-efficient fire management program. (Forest Plan Goal III-4)</p> <p>Utilize the commercial timber sales program to help decrease the risk of insect and disease infestations both now and in the future. (Forest Plan Goal III-3)</p>

3. Provide wood products now and in the future	<p>Offer commercial timber sales and other public harvesting opportunities where it is feasible. (opportunity)</p> <p>Maintain productive, well stocked stands to enhance future opportunities for wood utilization. (opportunity)</p> <p>Maintain, or improve an adequate road system to facilitate wood product transport and other management activities in suitable areas. (opportunity)</p> <p>Provide commercial forest products to local dependent industries at a level commensurate with adhering to the Forest Management Area Direction and in harmony with other Plan goals. (Forest Plan Goal III-3)</p> <p>Provide the opportunity to supply the local residents with fuelwood. Meet the demand for personal-use fuelwood. (Forest Plan Goal III-3)</p>
4. Protect and enhance range resources	<p>Utilize silvicultural treatments (including prescribed burning) to maintain open parks and meadows by reducing or interrupting conifer encroachment. (opportunity)</p> <p>Utilize silvicultural treatments that reduce stand densities, and create openings to increase forage production in forested areas within the 4B, 5B and 6B management areas. (opportunity)</p> <p>Invest in range improvements to increase forage utilization (Forest Plan Goal - 6B management area)</p> <p>Remove trees encroaching into rangelands (Forest Plan Goal - 6B management area)</p>

### 1.6. Forest Plan Management - Area Prescriptions

Management areas are identified within the Forest Plan to guide project implementation and provide standards and guidelines. Table 3 summarizes the acres of National Forest land within the Cochetopa Hills planning unit reported by designated management area.

Table 3. Forest Plan Management Areas within the Cochetopa Hills Vegetation Management Project Planning Area

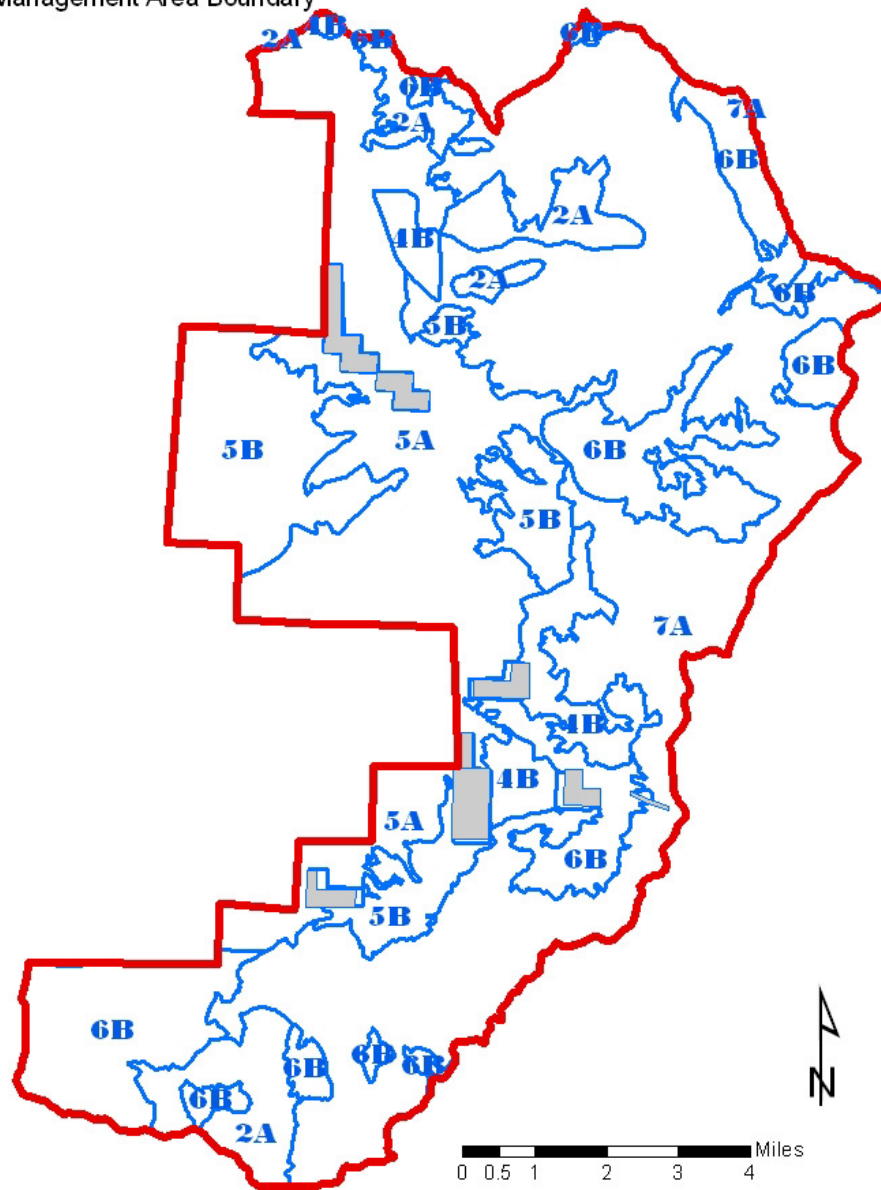
Management Area Description	Acres
PVT - private land	1,372
2A - Semi-Primitive Motorized Recreation Opportunities	4,023
4B - Wildlife Habitat Management For One or More Management Indicator Species	2,630
5A - Big Game Winter Range in Non-Forested Areas	12,395
5B - Big Game Winter Range in Forested Areas	6,744
6B - Livestock Grazing - Maintain Forage Composition	9,942
7A - Timber Management on Slopes Under 40 Percent	24,146
<b>Total</b>	<b>61,252</b>



Figure 2. Management Areas within the Cochetopa Hills Planning Area.

**Legend**

- Cochetopa Hills Planning Area
- Management Area Boundary



A brief description of each management area, and relevant goals and standards are listed here:

**2A – Semi-Primitive Motorized Recreation Opportunities**

Management emphasis is for semi-primitive motorized recreation opportunities such as snowmobiling, four-wheel driving, and motorcycling.

**4B - Wildlife Habitat Management for One or More Management Indicator Species**

Management emphasis is on the habitat needs of one or more management indicator species. Species with compatible habitat needs are selected for an area. The goal is to optimize habitat capability, and thus numbers of the species. The prescription can be applied to emphasize groups of species, such as early succession dependent or late succession dependent, in order to increase species richness or diversity. A full range of tree harvest methods and rangeland vegetation treatment methods are available.

**5A - Big Game Winter Range in Non-Forested Areas**

Management emphasis is on winter range for deer, elk, pronghorns, bighorn sheep, and mountain goats. Treatments are applied to increase forage production of existing grass, forb, and browse species or to alter plant species composition. Prescribed burning, seed for wildlife and range, spraying, planting, and mechanical treatments may occur. Browse stands are regenerated to maintain a variety of age classes and species.

**5B - Big Game Winter Range in Forested Areas**

Management emphasis is on forage and cover of winter ranges. Winter habitat for deer, elk, bighorn sheep, pronghorn, and mountain goats is emphasized. Treatments to increase forage production or to create and maintain thermal and hiding cover for big game are applied. Tree stand treatments can be clearcut or shelterwood. Commercial and noncommercial stand treatments occur. Specific cover-opening ratios and stand designs are maintained. Treatments to noncommercial tree species include spraying, burning, falling and mechanical chopping or crushing. A variety of browse age classes are maintained. Continuous forest cover is maintained on some sites.

**6B - Livestock Grazing - Maintain Forage Composition**

The area is managed for livestock grazing. Intensive grazing management systems are favored over extensive systems. Range condition is maintained through use of forage improvement practices, livestock management, and regulation of other resource activities. Investment in structural and nonstructural range improvements to increase forage utilization is moderate to high. Structural improvements benefit, or at least do not adversely affect wildlife. Conflicts between livestock and wildlife are resolved in favor of livestock. Nonstructural restoration and forage improvement practices available are seeding, planting, burning, fertilizing, pitting, furrowing, spraying, crushing and plowing. Cutting of encroaching trees may also occur.

**7A - Timber Management on Slopes Under 40 Percent**

Management emphasis is on wood-fiber production and utilization of large roundwood of a size and quality suitable for sawtimber. Engelmann spruce-subalpine fir clearcuts are less than 5 acres in size to promote natural regeneration. The area generally will have a mosaic of fully stocked stands that follow natural patterns and avoid straight lines and geometric shapes.

**1.7. Forest Plan Management – Direction**

The 1991 Grand Mesa, Uncompahgre and Gunnison National Forests Amended Land and Resource Management Plan (Forest Plan), is the programmatic document required by the rules implementing the Forest and Rangeland Renewable Resources Act of 1974 (RPA) as amended by the National Forest Management Act of 1976 (NFMA). The purpose of the Forest Plan is to provide direction for the multiple use and sustained yield of goods and services from NFS lands in an environmentally sound manner. The Forest Plan provides overall goals and objectives, standards and guidelines, and management area-specific goals and objectives that direct management of the Grand Mesa, Uncompahgre and Gunnison National Forests. The following section lists the relevant Forest Plan goals that are applicable to this project.

**1.7.1. *Forest Level Goals and Objectives*****Amended GMUG NF Land and Resource Management Plan (Forest Plan)**

Page III-2 Goals (vegetation):

- Manage vegetation in a manner to provide and maintain a healthy and vigorous ecosystem resistant to insects, diseases, and other natural and human causes. This will be done primarily through the commercial timber sale program ... these treatments should, where possible, provide a range of multiple-use outputs a few of which are fish and wildlife habitat, wood fiber, and economic benefits to the society.

Page III-3 Goals (wildlife):

- Increase and improve wildlife habitat diversity.
- Increase vertical and horizontal diversity.

Page III-3 Goals (timber):

- Provide commercial forest products to local dependent industries at a level commensurate with adhering to the Forest Management Area Direction and in harmony with other Plan goals.
- Utilize the commercial timber sales program to help decrease the risk of insect and disease infestations both now and in the future.
- Provide the opportunity to supply the local residents with fuelwood. Meet the demand for personal-use fuelwood.

Page III-3 Goals (water):

- Increase water supply, while reducing soil erosion and stream turbidity.

## Page III-4 Goals (protection):

- Prevent and control insect and disease infestations.
- Provide a cost-efficient fire management program.

## Page III-4 Goals (soils):

- Conserve soil resources.
- Maintain long term land productivity.

**Southern Rockies Lynx Amendment (SRLA), ROD**

The Southern Rockies Lynx Amendment was adopted in 2008 by the U.S. Forest Service Rocky Mountain Region to amend Forest Land and Resource Management Plans to better conserve Canada lynx in the area. The amendment applies to all eight Forest Plans in the Southern Rockies, and provides consistent management direction across all forests. The amendment covers approximately 14.6 million acres of National Forest land, of which about 7.5 million acres have been mapped as lynx habitat. Mapping and analysis of the area was completed by the U.S. Forest Service, in coordination with the U.S. Fish and Wildlife Service, under the Canada Lynx Conservation Agreement (2000, 2005, 2006b).

The Amendment includes direction for vegetation management. Because of its dependence on snowshoe hare, vegetation management practices that reduce snowshoe hare habitat or populations directly impact lynx survival.

The Southern Rockies Lynx Amendment includes the following objectives (SRLA, 2008):

## Objective30 ALL O1

- Maintain or restore lynx habitat connectivity in and between LAU, and in linkage areas.

## Objective VEG O1

- Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.

## Objective VEG O2

- Provide a mosaic of habitat conditions through time that support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.

## Objective VEG O4

- Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.

## 1.8. Relationship of the Proposed Action to the Forest Plan and the Purpose and Need

The proposed action was developed to accomplish the relevant Forest Plan goals as described in the Purpose of and Need for Action section of this chapter (section 1.5). The general (strategic level) Forest Plan goals have been translated into more detailed, and specific (tactical level) purpose and need statements as listed in Table 2. The relationships between each identified purpose and need element and the proposed activities are summarized below.

### *1.8.1. Activities to Create/Maintain Forest Age Class and Species Diversity within the Landscape*

As forest stands mature, the canopy and site occupancy of the overstory trees modify the stand environment, and can severely reduce or eliminate the successful regeneration of certain shade intolerant tree species (pioneer species). Retention of these pioneer species (lodgepole pine, aspen, bristlecone pine and ponderosa pine) on the landscape largely depends on stand disturbance to interrupt, or alter the successional pathway of the stand. Furthermore, dense stands with a closed canopy of older aged trees (prior to stand breakup) tend to have low age class diversity due to lack of recent tree regeneration – even in stands with more shade tolerant species (Engelmann spruce, blue spruce, Douglas-fir, subalpine fir). Any stand disturbance that creates openings in a dense tree canopy will promote tree regeneration and increase age class diversity. When pioneer species are present in a stand, species diversity is often increased as well.

**To maintain/create forest age class and species diversity, the proposed action includes the following activities:**

- Apply group selection and individual tree selection treatments to a portion of the mixed conifer, spruce fir and spruce-fir/aspen forest types.
- Apply clearcutting and patch cutting treatments to a portion of the lodgepole pine and mixed conifer forest type.
- Apply coppice treatments to high priority aspen stands.
- Apply restoration treatments to high priority stands identified in the ponderosa pine, bristlecone pine and dry mixed conifer forest types.
- Apply shelterwood seed step treatments in selected stands within the lodgepole pine and dry mixed conifer forest types.
- Utilize low intensity surface fires to maintain the ponderosa pine and dry mixed conifer forest types where they have been treated in the past.

### *1.8.2. Activities to Protect Forests from Insects, Diseases, and Wildfire*

Mature stands of pine trees (lodgepole, ponderosa, bristlecone and limber) are susceptible to mountain pine beetle attack and mortality, especially when they are under stress. When populations are high, mountain pine beetles may also attack healthy trees and open stands. Thinning dense pine stands to allow more resources for each tree is an effective method of reducing infestation rates (Gibson, et.al. 2009). Spruce beetle risk can be reduced in spruce-fir stands by creating healthy stand conditions with moderate to high growth rates (Holsten, et.al. 1999). Stand regeneration can affect risk of infestation by decreasing stand density and diversifying stand structure across the landscape in all forest types.

Root rots and other fungal diseases can impact tree and stand health. These diseases are normally limited in spatial extent and can be successfully treated by either a focused sanitation treatment or a regeneration/thinning treatment that favors other species that are not susceptible to the disease, and by minimizing activities that aid in the spread of the disease (bark wounding).

Aspen stands are particularly susceptible to diseases when they reach maturity. Recently, evidence of rapid, widespread mortality caused mainly by secondary damaging agents has been documented in Colorado (Worrall, et.al., 2008). Decline in aspen stands can be treated by creating stand replacing disturbance that will regenerate the stand with young aspen sprouts.

Dwarf mistletoe is a parasite that is present in certain stands of lodgepole pine within the Cochetopa Hills planning area. This parasite can be eliminated or reduced by killing all the infected trees and establishing a new, un-infected cohort of tree regeneration to occupy the site (Hacksworth & Dooling, 1984).

White pine species (bristlecone and limber pine) within the Cochetopa Hills planning area are susceptible to white pine blister rust (WPBR). Successful long term mitigation for WPBR focuses on selecting genetically resistant trees to reproduce and occupy the site. This strategy can minimize the negative ecological impact of WPBR. Genetic resistance can be promoted by laboratory testing. Recent research has suggested a natural method of genetic selection, whereby a younger cohort of trees is proactively established in white pine stands. When WPBR infests the stand, the young trees that are most vulnerable and are impacted faster will die, leaving the more resistant gene pool within the stand (Coop and Schoettle, 2008). The larger, mature trees take longer to succumb to the effects of WPBR, and it could be decades before the most vulnerable mature trees die.

Protection from the damaging effects of fire is an important goal in the Cochetopa Hills planning area. Much of the area is designated as management area 7A (Timber Management on Slopes Under 40 Percent) and is not compatible with wildland fire as a management tool in many areas. Conversely, the planning area is adjacent to four major Inventoried Roadless Areas (IRA), (Cochetopa Hills – 71,400 acres, Middle Fork- 11,200 acres, Cochetopa Dome – 7,200 acres, and Monchego – 3,900 acres) where restoring the natural role of fire is the most appropriate tool available for maintaining forest diversity and an ecologically functioning, less damaging fire regime. Strategically placed fuel breaks along the

boundary between IRAs and multiple use areas can help facilitate the reintroduction of wildfire into the IRAs.

**To protect forests from insects, diseases and wildfire, the proposed action includes the following activities:**

- Thin high priority bristlecone, lodgepole and ponderosa pine stands to reduce the risk of mountain pine beetle mortality.
- Create openings in a portion of the bristlecone pine stands where regeneration is lacking, to establish a young cohort of trees that accelerates the natural selection of WPBR resistance within the stand.
- Apply clearcutting and patch cutting treatments to priority lodgepole pine stands that are infested with dwarf mistletoe.
- Apply coppice treatments to regenerate a portion of the declining aspen stands within the planning area.
- Design and implement strategically located fuel breaks to allow for wildfire to resume a more natural role within the landscape of IRAs and protect timber management areas.
- Thin high priority dry mixed conifer stands to create stand conditions where frequent, low intensity fire can be re-introduced to maintain (restore) historic stand conditions.

*1.8.3. Activities to Provide Wood Products Now and in the Future*

The use of commercial wood product sales is an important tool used by the U.S. Forest Service to accomplish forest treatments and provide societal benefits. Treatment costs can be substantially reduced when revenue is produced from the value of wood products removed during stand treatments. With the offset in treatment costs, beneficial work can be sustained at a higher level than would be possible if all treatments were funded from other sources (Federal tax revenue or grants). Furthermore, a significant economic benefit is provided to local, rural communities and society as a whole. This economic benefit is realized in the opportunities that are provided, the diversity of industry added to largely tourist based rural economies, and the production of energy, building material and other useful products for society.

Because long term, sustained production of wood products is critical to support and maintain a wood products industry, stands must be managed to exhibit moderate to high growth rates, resist insect and disease infestation, and be harvested at a sustainable level.

To provide for commercial opportunities, a safe and environmentally sound transportation system must be established. In much of the Cochetopa Hills planning area a suitable road system is in place to allow the removal of wood products. However, there are areas that have poorly located road alignments which are not suited for timber removal in their current state.

**To provide wood products now and in the future, the proposed action includes the following activities:**

- Design silvicultural prescriptions to provide opportunities to harvest wood products (sawtimber, poles, fuelwood, biomass) where it is compatible with other Forest Plan objectives.
- Schedule treatments during this entry at a level that will provide long term, sustained levels of timber production over multiple entries.
- Design silvicultural treatment to create healthy, well stocked, productive stands where it is compatible with Forest Plan goals.
- Analyze, design re-construction and/or construct an adequate transportation system for wood product removal in areas designated for such purposes.
- Develop a gravel source in close proximity to the transportation network within the planning area to facilitate efficient road maintenance.

*1.8.4. Activities to Protect and Enhance Range Resources*

With the lack of fire over the past 80 to 100 years in the open parks and meadows of the Cochetopa Hills planning area, large, mature shrub vegetation and tree cover has increased. Cutting or burning this older vegetation will clear sites for greater occupancy by grasses and forbs, and provide a range of vegetative diversity that more closely mimics historical conditions.

**To protect and enhance range resources, the proposed action includes the following activities:**

- Utilize prescribed burning in high priority areas to rejuvenate range vegetation and increase forage production.
- Mechanically kill or remove trees that are encroaching into rangeland areas.
- Utilize silvicultural treatments to open stands and increase forage production in the understory within selected areas of the 5B and 6B management areas (Range and Wildlife).

**1.9. Decision Framework**

The responsible official will decide which actions, if any, to implement. This decision will be based on:

- Whether the proposed activities and alternatives address the issues, are responsive to national policy or guidance and direction in the Forest Plan, and meet the purpose of and need for action in the Cochetopa Hills Vegetation Management Project; and
- Whether the information in this analysis is sufficient to implement the proposed activities.

If an action alternative is selected, project implementation could begin in the spring of 2014. Most actions would be accomplished within a decade.



### 1.10. Key Issues Associated with the Proposed Action

An issue is defined as a point of discussion, debate or dispute about effects of a proposed action on a physical, biological, social, or economic resource. An issue is not an activity in itself; instead, it is the projected effects of the activity that create the issue. For example, timber harvesting is an activity, but its effects on a resource can form an issue.

Some issues are considered *Key* because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict. Key issues are used to develop and compare alternatives, prescribe mitigation measures, and define the environmental effects to be analyzed. For an issue to be considered *key*, it must be relevant to the specific project and appropriately addressed at that level. The Forest Service identifies key issues through internal/external contact and discussion (scoping). External scoping involves the general public, stakeholder groups, tribal governments, State, and other Federal Agencies.

Scoping comments received through external scoping were used by the interdisciplinary team (IDT) to identify Key Issues by which the proposed action and all alternatives are developed and analyzed. The process is intended to ensure that all Key Issues are identified and that all relevant issues are appropriately addressed in the analysis. Each concern received during scoping was considered as a potential issue and was evaluated to determine whether the related issue was addressed through project design, addressed through implementation of project specific mitigation measures, or beyond the scope of the project.

Through the process, four Key Issues were identified for this Analysis Area. The Key Issues, along with the indicator(s) of each issue, are presented below. Indicators that are quantifiable, linked to cause-and-effect relationships, and responsive to the Key Issues are used to compare effects among alternatives.

#### 1.10.1. *Key Issue 1- Forest Condition*

*Continued loss of tree species and age class diversity on the landscape, and the resulting increase in insect and disease susceptibility will create unacceptable declines in forest health and bio-diversity, and increased fuel loading and tree mortality.*

The ecology of forest types within the Cochetopa Hills planning area is dependent on fire and other disturbance events. Fire, insect and disease events can only play a limited ecological role within the Cochetopa Hills landscape, because these agents are largely incompatible with other Forest Plan goals for the area (wood production, air quality, protection of private property, public safety). With the removal of a functioning natural disturbance regime, forest health and diversity will be reduced if active silvicultural management is not practiced. Forest dynamics operate on very long time scales, and to postpone or discontinue treatments within this landscape will create undesirable conditions in the

future, and eliminate future opportunities. If treatments are not maintained on a sustainable, ongoing basis, certain opportunities to be pro-active in forest stand dynamics will be lost and remaining management options will be largely reactive – as we see with many of the lodgepole pine landscapes in northern Colorado.

#### **Issue indicators**

- Proportion of seral stages on the landscape within each forest cover type as compared to the expected mix under a functioning historic disturbance regime.
- Acres of reduced mountain pine beetle risk rating in lodgepole pine forest types.
- Acres of reduced spruce beetle risk rating in spruce-fir and spruce-fir/aspen forest types.
- Acres of regeneration treatment (coppice, clearcut, group selection, selection).

#### *1.10.2. Key Issue 2 – Economic Viability of Proposed Treatments*

*The high cost of the road construction and reconstruction associated with certain units in the southern portion of the planning area may not provide an adequate cost-to-benefit ratio to justify treatment at this time.*

The road system in the southwest portion of the planning area was not designed for hauling wood products, and will require some construction of new roads and reconstruction of existing roads to allow for hauling operations. The value and volume of potential wood products in some of the stands in this portion of the planning area combined with “stewardship contract” funding may not be high enough to cover the cost of improving the transportation system at this time.

#### **Issue indicators**

- Positive benefit-to-cost ratios.

#### **1.11. Other Issues**

The IDT reviewed the Forest Plan and public scoping comments in order to develop a broader list of the issues, concerns, and opportunities associated with the proposed action. The issues listed here will be addressed in the analysis but are not considered key criteria in the analysis. These issues, along with the rationale on why they are not key to the analysis, are presented below:

Forest canopies that are opened up as the result of silvicultural treatments could be exposed to higher wind throw risk – especially in spruce-fir stands. *Rationale: Wind throw risk will be evaluated for the proposed treatments in spruce-fir stands. Silvicultural prescriptions will be developed that account for the potential wind throw risk. Post-harvest monitoring of wind throw will occur and subsequent treatments applied if necessary.*

Unacceptable levels of soil compaction and/or erosion could result from hauling or logging operations. Silvicultural treatments, road maintenance, construction and reconstruction activities all have the potential to negatively impact soil resources through compaction and erosion. *Rationale: The cumulative impacts to the soil resource will be evaluated and treatments will be designed to assure that Forest Plan Standards and Guidelines are adhered to.*

### 1.12. Public Involvement and Scoping

Scoping is the process of obtaining public comments about proposed Federal actions to determine the range of issues to be addressed. Comments on the proposed action were solicited from members of the public, other public agencies, tribal governments, adjacent property owners, interest groups, and Forest Service specialists. Various methods were used to request comments, including the following:

- A scoping letter was mailed to interested parties, including property owners, tribal members, State and Federal Agencies, and other organizations. Three separate mailings were sent on June 8, 2010, February 17, 2011 and February 23, 2011. These letters included a description of the project area, an overview of the planning process, a general explanation of the proposed actions, and an invitation to comment.
- A public field tour was conducted on June 30, 2010. The tour was attended by 5 interested parties and 5 agency employees. Attendees were encouraged to submit comments on the proposed actions or to document their concerns associated with the project area.
- Other information sharing, communication and interaction with interested parties, agencies, and individuals has occurred on a continuing basis during project planning. A Notice of Opportunity to Comment was published in the local newspaper, the *Gunnison County Times*. Additionally, letters were sent to all interested parties identified for external scoping. This Notice of Opportunity to Comment was initiated on August 8, 2013 and closed on September 7, 2013, in accordance with 36 CFR 218. Information shared by such parties has been considered by the IDT in the development of this EA.

A detailed response to comments from the Agency is provided in Appendix C.

## 2. ALTERNATIVES

This chapter provides a detailed description of the no action alternative (Alternative 3), an economic based alternative (Alternative 2) and the proposed action (Alternative 1). Maps of the two action alternatives are located in Appendix A. This chapter presents and compares the alternatives, both quantitatively and qualitatively. The intent is to provide the public and the Responsible Official a basis for a choice among management options when considering the environmental consequences of implementing each alternative, as disclosed in Chapter 3 of this EA.

A brief overview is provided of alternatives considered by the IDT and the decision-maker but eliminated from detailed development and study. The last section of the chapter contains a tabular summary of effects.

### 2.1. Description of Alternatives

This section describes activities that are planned to occur during implementation of the alternatives that were analyzed in detail. All figures are approximate and may vary due to irregular stand structure, small inclusions of inoperable ground, application of design criteria, or other factors not immediately evident upon initial analysis. Actual figures may increase or decrease during on-the-ground preparation of the project. Implementation of past projects indicates that the amount of land treatments implemented following a decision is regularly less than the amount of land treatments authorized.

Implementation of both action alternatives will follow the general descriptions provided here, and will follow all applicable laws, regulations and Agency policy. Additionally, project-specific design elements (criteria) were developed through the IDT evaluation, and will be used as applicable. These design features are listed in Appendix B of this document.

Since the inception of this project, a spruce bark beetle epidemic within the spruce-fir and spruce-fir/aspen cover type has occurred within the Cochetopa Hill planning area which has dramatically altered the state of these communities. Mortality rates of mature spruce trees are in excess of 95% in most stands, and the epidemic is spreading extensively across the landscape. Due to this changed condition, all treatments in spruce-fir cover types proposed under both action alternatives will be removed from our proposal. Much of the information and analysis contained in this report assumes the pre-outbreak condition for the spruce-fir cover type. Only a moderate component of spruce-fir forest type exists in the planning area (9%), and all treatments within the spruce-fir stands will be removed from this proposal, therefore, it was determined that a comprehensive evaluation of this changed condition was not required to provide an adequate analysis for this EA and the resulting management decision. Where the changed condition has a critical effect on a particular conclusion or resource condition, the appropriate analysis is included in those portions of the document.

A separate NEPA planning process has been initiated at the GMUG NFs level to allow the salvage of spruce-fir from the areas of the GMUG NFs that have been infested by the beetle epidemic. This planning effort will include the Cochetopa Hills analysis area, however, the exact treatments are not known at this time.

### *2.1.1. Alternative 1 – Proposed Action*

The Proposed Action is designed to meet the purpose and need for the project as stated in Chapter 1. This alternative was developed based on the available scientific knowledge, agency expertise, site visits, field surveys and consultation with the public and other agencies. The proposal is based on a landscape level planning strategy to consider treatments of all vegetation types within the planning area. A key component of the alternative is the use of commercial wood products harvesting to provide economic opportunities and to finance some, or all of the treatment activities. Specific activities are described below as they relate to the purpose and need they are designed to address.

The proposed action analyzed in this EA differs from the proposed action that was presented during the initial scoping period in 2010. Based on the issues identified during scoping and additional field review, the proposed treatment units and prescriptions were refined to form the alternative that is presented here.

The proposed action includes a variety of mechanical and prescribed burning vegetation treatments on approximately 11,857 acres. Mechanical treatments are proposed for approximately 5,960 acres and include both commercial and non-commercial operations. Prescribed burning would occur on 5,897 acres (Table 4). The location of these treatments is displayed on Map 2 in Appendix A. Stewardship Contracting opportunities through which the Forest Service exchanges goods for services may also be allowed under this alternative.

To facilitate the treatments described above, an estimated 4.7 miles of NFS road would need to be re-routed (i.e., a new road template built) and 13.5 miles of existing road would require improvements (reconstruction). The proposed action would also require the use of approximately 17.4 miles of existing NFS road that would require some level of preparation, which could range from minimal maintenance activities (pre-use maintenance) to minor reconstruction of the road template, depending on the current condition of the road. Treatments proposed under Alternative 1 are summarized in Table 4 and described in detail below. Figures are approximate.

Table 4. Vegetation Treatment Activities of the Proposed Action

<b>Treatment</b>	<b>Acres</b>
<b><i>mechanical treatments</i></b>	
Aspen coppice (clear cut)	244
Bristlecone pine thinning	31
Clearcut	144
Fuel break -group selection	184
Fuelbreak - patch cuts	29
Group Selection	3,857
Mistletoe control strip cut	38
Overstory removal	209
Patch cut (old strips)	71
Pine & Douglas-fir thinning (restoration)	745
Pole thinning	121
Poles - clearcut	53
Poles thinning with Aspen patch cuts	27
Shelterwood seed step - Douglas-fir	47
Shelterwood seed step - lodgepole pine	130
Uniform Selection	30
<b>Total</b>	<b>5,960</b>

<b><i>prescribed burn treatments</i></b>	
Maintenance burn Douglas-fir/ponderosa pine	1,717
Rangeland maintenance improvement burn	4,143
Aspen Burn	37
<b>Total</b>	<b>5,897</b>

Potential wood products that could be generated from treatment activities include: saw timber, fuelwood, posts, poles, mine props, house logs and woody biomass. It is estimated that 25,326 CCF of sawtimber, 1,242 CCF of posts, poles and mine props, and 35,618 green tons of woody biomass (*assume 2 green tons per CCF*) will be produced through implementation of this alternative.

In addition to the silvicultural activities listed above, cutting of conifer trees encroaching into riparian areas and meadows will occur at some sites within the planning area. These treatments will involve cutting or girdling small trees with hand tools, and will not include wood removal.

**Proposed Vegetation Treatments**Aspen Burn (Aspen Burn, 37 acres)

The Aspen Burn treatment prescription is intended to stimulate a vigorous sprouting response in aspen dominated stands through the use of a stand replacing fire. Moderate to high intensity surface fire will be used to kill 85 to 100% of the trees in the treatment stand. Where adequate fuel beds are not present, a mechanical pretreatment will be used to create “red slash” from encroaching conifer trees regenerating in the understory of these stands.

Bristlecone Pine Thinning (BC Restore, 31 acres)

This treatment is designed to promote bristlecone pine regeneration and beetle resistance using group cuts and thinning from below. No more than 20 percent of the stand will be cut in small groups of 1/8 to 1/2 of an acre. Thinning would occur only where stand densities are greater than 250 trees per acre, and would not remove more than 20% of the existing basal area. Some mechanical soil scarification may be used to increase seed germination and seedling survival.

Clear Cut (CC, 144 acres)

This treatment will remove all trees and regenerate the stand. Mechanical site preparation will be used to promote seed germination and seedling survival. Snags and downed logs will be retained on site as prescribed in the Forest Plan and by the District Biologist. This treatment will occur primarily in areas where Lodgepole Pine is the dominant tree species.

Aspen Coppice (coppice, 244 acres)

This treatment will remove all live aspen trees from the stand to trigger an abundant sprouting response (coppice) and re-establish a pure stand of aspen growing in open conditions. Sprout protection will be provided through dispersal of browsing pressure or fencing where needed.

Fuel break -Group Selection (Fuelbreak GS, 184 acres)

This treatment will harvest trees in groups that are placed on the landscape in locations that will help slow the rate of wild fire spread and/or provide defendable areas for wild fire suppression efforts. Groups would be larger than a typical group selection unit in other parts of the planning area, and would not be distributed as uniformly within the stand. No more than 20% of the stand area would be cut during this entry, and groups would range from .25 acres to 5 acres. Regeneration would be established in group openings using mechanical soil scarification.

Group Selection (GS, 3,857 acres)

This treatment will harvest trees in groups that are placed uniformly within the stand to promote regeneration. Emphasis for group placement will focus on pockets within the stand of diseased and damaged trees in the conifer or mixed conifer cover types, and/or mature or declining aspen or lodgepole pine patches that are in need of regeneration. No more than 25 percent (20% in Lynx habitat) of the stand area will be cut during this entry, and group size will average .25 acres but may be as big as 2 acres. Where aspen or lodgepole pine pockets are large, the use of patch cuts (up to 10 acres) may be incorporated into this prescription to facilitate aspen coppice and sprout protection, or open conditions for pine regeneration. Within conifer dominated groups, mechanical soil scarification may be used to promote seed germination and seedling survival.

Mistletoe Control Strips (mistletoe control, 38 acres)

This treatment will remove all lodgepole pine trees within known dwarf mistletoe areas surrounding recently regenerated harvest units. Removal will not extend more than 500 feet from the edge of each regeneration unit, and will follow all forest plan guidelines for snag, downed logs, and green up requirements.

Overstory Removal (OR, 209 acres)

This treatment will remove all mature trees within predominantly lodgepole pine and Douglas-Fir stands to allow the existing tree regeneration to fully occupy the site and establish an even-aged stand of trees growing in fully open conditions. Regeneration will be protected to the extent possible to ensure adequate stocking of undamaged trees after the completion of operations.

Maintenance Burn Douglas-fir and Ponderosa Pine (P burn - DF/PP), 1,717 acres)

This treatment will reduce ground and surface fuels using a low intensity surface fire. Burning will occur under controlled circumstances using the following general prescription: scorch heights of the live crowns remain under 40% with a desired scorch of 20-25%, mortality of trees over 10" is less than 10%, reduce ladder fuels by >50%, and reduce the dead fuel loadings as follows: 1hr 70-90%, 10hr, 50-70%, 100hr, 30-50%, and 1000hr, 20-40%. The main objective is to move condition class 2 and 3 to condition class 1 or 2 or maintain condition class 1 or 2 where it currently exists.

Rangeland Maintenance and Improvement Burn (P burn - range, 4,143 acres)

This treatment will regenerate late seral shrub and grass communities in rangeland using a mixed intensity surface fire. Prescription objectives include 40% to 60% mortality (area basis of mature shrubland structure distributed in a mosaic pattern across the treatment unit). Where sparse tree cover



is present, burning will be used to reduce the conifer invasion into these grass areas (i.e. underburn the mature PP, DF, and BC and regenerate the aspen). Prescriptions would be designed to control the rate of spread and fire intensity. Maintenance burning in shrub dominated treatment areas would be required over a 20-30 year cycle. Grassland parks dominated by Parry's oatgrass and rabbit brush could benefit from a 15-20 year cycle to maintain forage vigor and palatability. Prescribed burning could occur in spring, summer or fall.

Patch Cut (old strips), (*Patch cut - strips, 71 acres*)

This treatment will remove the residual lodgepole pine strips that were left during the last harvest entry (strip regeneration cuts), to regenerate the remaining portion of the stand. Some portions of the residual strips will be left to facilitate wildlife habitat movement corridors.

Poles Clearcut, (*Poles clearcut, 53 acres*)

This treatment will remove all trees within "dog hair" or mistletoe infested lodgepole pine stands to provide for a post and pole harvesting opportunity and to regenerate the stand. Mechanical soil scarification will be used to promote seed germination and seedling survival. Snag and downed logs will be retained (were present) according to Forest Plan standards and/or the direction of the District Biologist.

Poles Thinning with Aspen Patch Cuts, (*Poles thin – AS, 27 acres*)

This treatment will thin stands to allow the harvest of post and pole material and enhance the growth and health of the remaining trees. Thinning will generally remove the smallest, suppressed trees and will follow all requirements of the Forest Plan amendment for lynx management. No more than 25% of the stand basal area will be removed during this harvest entry within conifer dominated portions of the stand. Where pockets of mature or declining aspen are found in need of regeneration, group cuts of no larger than 2 acres may be used to promote sprouting.

Pine and Douglas-fir Thinning (Restoration), (*PP/DF restore, 745 acres*)

This treatment will remove trees from the stand that have grown into the site due to fire suppression activities. Most trees that are not a residual component of the stand as it existed prior to fire suppression (1910) activities will be removed. If a sufficient amount of residual trees are not present on site, the largest (oldest dominant) trees present will be retained. This will be a heavy thinning from below. Upon completion of harvest operations, a broadcast burn surface fire will be used to reduce fuel loads and stimulate a moderate amount of pine and or Douglas-fir tree regeneration.

Uniform Selection, (SEL, 30 acres)

This treatment will remove trees from all size (age) classes in a uniform distribution throughout the stand to trigger the regeneration of shade tolerant spruce, and fir trees. No more than 25% to 30% of the existing basal area will be removed during this harvest entry.

Shelterwood Seed Step - Douglas-fir, (SWSS DF, 47 acres)

This treatment will remove trees uniformly throughout the stand to create openings large enough to regenerate Douglas-fir trees. Trees to remove will include damaged, diseased, and suppressed trees that would not make good seed trees. This will generally be a thinning from below, with the dominant, full crowned trees remaining on site as seed trees. Removal will not exceed 40% of the existing basal area and mechanical soil scarification will be used to promote seed germination and seedling survival.

Shelterwood Seed Step – Lodgepole Pine, (SWSS LP, 130 acres)

This treatment will remove trees uniformly throughout the stand to create openings large enough to regenerate lodgepole pine trees. Trees to remove will include damaged, diseased, and suppressed trees that would not make good seed trees. This will generally be a thinning from below, with the dominant, full crowned trees remaining on site as seed trees. Removal will not exceed 40% of the existing basal area and mechanical soil scarification will be used to promote seed germination and seedling survival.

**Road Use and Management Activities**

Road use by the general public is controlled through the recently adopted Gunnison Travel Management Plan. This plan identifies approved travel routes and modes of acceptable travel. The existing roads that are no longer open to public travel and will be decommissioned from the National Forest Road System are also identified. Most of the roads specified for decommissioning within the Cochetopa Hills planning area will not be used for accessing treatment units. However, there are some decommissioned segments that will be needed for hauling wood products. These segments are short extensions and “spur” roads that connect to open roads and total 4.6 miles over the planning area (Map 3, Appendix A). These roads will be physically closed after wood hauling and treatment activities are complete. If needed, signing may be used to prevent public use while treatments are being implemented.

The Cochetopa Hills planning area is an important part of the Gunnison Ranger District for producing wood products and providing these valuable economic and social opportunities. A well designed and maintained timber hauling road system is an important element to the continued management of this area. Given this consideration, investments in road construction, reconstruction, and maintenance

activities, in addition to the development of a local gravel pit, are planned within the project area. Table 5, and Map 3 in Appendix A display the roads that are planned for timber hauling and the anticipated road work that will be needed to facilitate safe use.

Table 5. Planned Haul Roads Reported by Expected Work Needed to Allow Hauling – Alternative 1

<i>Forest Roads (not county or state)</i>	
<b>Work Description</b>	<b>miles</b>
standard maintenance	20.8
decommission road segment, due to re-route	2.5
upgrade existing road to minimum haul specifications	14.6
maintain and/or reconstruct existing haul roads	17.8
new construction for re-route/extension	4.7
open administratively closed routes to haul specifications	11.2
<b>Subtotal (forest roads)</b>	<b>71.7</b>
<i>County Roads &amp; Highway 114</i>	
<b>Road Name</b>	<b>miles</b>
COCHETOPA PARK (Archuleta cut off)	5.3
SAGUACHE COUNTY RD NN-14	16.6
SAGUACHE COUNTY ROAD 17-FF	2.2
SAGUACHE PARK	6.0
STATE HWY 114	13.9
<b>Subtotal (county &amp; state roads)</b>	<b>44.1</b>
<b>Grand total</b>	<b>118.8</b>

Road maintenance on the county roads and Highway 114 within the planning area is performed by county and state crews on an ongoing basis and would not represent new activities under this proposal. Additionally, 20.8 miles of “forest road” would require only routine maintenance. The following section provides a detailed description of the road work that will be needed for the road segments reported in Table 5 above, and Map 3 of Appendix A.

#### Standard Maintenance (20.8 miles)

This activity will include the standard, on-going maintenance that is currently applied to these roads. These activities would occur even without the implementation of this project; however, the timing will change due to the need to access treatment areas over the implementation period for this project (10 years). Work activities will include cleaning ditches, rolling dips, water bars and culverts, grading road surfaces, applying surface rock and clearing roadside brush.

Maintain and/or Reconstruct Existing Haul Roads (17.8 miles)

This activity will include minor reconstruction and pre-haul maintenance of existing haul roads that were designed and constructed for hauling wood products. Work activities will include reshaping the road prism, maintaining and/or repairing drainage structures, vegetation clearing, and minor reconstruction where upgrades are needed to accommodate long log trucks.

Upgrade Existing Road to Minimum Haul Specifications (14.6 miles)

This activity will include major reconstruction of existing two-track roads that were not designed or constructed for hauling wood products. Reconstruction activities will be designed to upgrade the road to at least the minimum standard needed for hauling wood products using a long log truck. Work activities will include widening the road prism, vegetation clearing, installing drainage structures to allow long log trucks, applying road surfacing in critical locations and constructing suitable water crossings where needed. Minor road re-alignment may also occur in critical locations.

New Construction for Re-route/Extension (4.7 miles)

This activity will include the construction of four new road segments to relocated existing routes that are currently in poor locations (not suitable for hauling wood products and causing negative resource impacts) and to extend one existing route 0.8 miles to facilitate forest management (NFSR 579). The newly constructed segments will be designed to at least the minimum standards to allow wood product removal with a long log truck. Construction activities will include vegetation clearing, minor slope excavation, installation of drainage structures, construction of water crossings and spot surfacing in critical locations.

Decommission Road Segment, due to Re-route (2.5 miles)

These road segments will be decommissioned after a re-routed segment is constructed to access the same land base. Decommissioning will involve signing, restoring natural drainage, constructing effective travel blockades and re-contouring and/or ripping of the road prism in critical locations.

Open Administratively Closed Routes to Minimum Haul Specifications (11.2 miles)

This activity will include the opening of administratively closed haul roads to allow wood product removal using a long log truck. Work activities will include temporary removal of closure gates,

vegetation clearing, reshaping of the road prism, maintaining and/or repairing drainage structures, and minor reconstruction where upgrades are needed to accommodate long log trucks.

### **Post-Treatment Transportation Management**

The Gunnison National Forest recently issued a decision on a new travel management plan which has been in effect since the fall of 2010. This plan specifies which routes are open for public travel and the modes of travel that are allowed on those routes. Allowable uses of existing NFS roads within the Cochetopa Hills project area are subject to the direction in this Forest-wide travel management plan. All existing roads that are identified for closure in the travel management plan, and are planned for wood removal use within this project (see “Road Management Activities” section above) will be physically closed after treatment operations are complete. All temporary haul roads, which are roads not currently on the management plan, needed for this project will be closed following treatment activities and will not be part of the motorized use network. The newly constructed segments (NFSR 579, 597, 864 and 878.1B) will be added to the transportation system without changing the mode of travel or level of public access (Appendix A, Map 3). Of these new roads, four of them are re-routed segments accessing the same area using a more desirable alignment, and one segment is a 0.8 mile extension of NFSR 579 to facilitate forest management activities.

All administratively closed roads will keep this designation and be closed to the public when operations are complete.

### **Continental Divide National Scenic Trail (CDNST)**

A large proportion (65%) of the CDNST within the Cochetopa Hills planning area is located on open, full-sized motor vehicle roads. Another 20% of the trail length is located on administratively closed timber hauling roads. Under Alternative 1, a total of 16.71 miles of roads are needed for hauling wood products that are co-located with the CDNST or where trail is adjacent to treatment units (Map 3, Appendix A). Of this total road length, 3.93 miles are located on administratively closed (gated) timber haul roads that currently exhibit a “single track” trail character and are closed to full-sized motor vehicle use by the public (agency use is authorized). If trail miles within units are also included (.74), then under Alternative 1, a total of 17.45 trail miles are affected.

### **Harvest Systems**

The specific harvest system to be employed for any given area to be treated would be determined at the time of layout. The harvest system selected will be based on topographical considerations, acceptable levels of residual fuels within stands, and soil nutrient requirements. Past experience indicates that whole tree yarding is likely to be used for the larger sized timber sales (> 4,000 CCF).

**Activity Fuels, Course Woody Debris (CWD) and Slash**

The method of slash treatment will depend on the forest type, existing stand condition and the objective of the treatment. At a minimum, to provide for soil protection and wildlife value, treatments will be designed to maintain at least 10-20 tons per acre of coarse woody debris. This will help retain soil moisture at ground level for mosses, fungi, and lichens and to encourage faster re-colonization of harvest units by small mammals and other prey species. Higher retention levels (20 to 40 tons per acre) could be maintained in the higher elevation spruce-fir and cool moist mixed conifer forest type where historic fire return intervals are longer, and will more closely match the ecology of these forest types. Where regeneration or fuel reduction is an objective of the silvicultural treatment, slash levels will be reduced if they will inhibit these objectives. Methods of slash treatment could include lopping and scattering, piling on site, piling at a landing, or mechanical chipping/mastication. Under each slash treatment method fire may be used to burn the material either as a broadcast burn through the treatment unit or burning of concentrated piles. If a biomass market develops, removal of slash from the site for this use may also be an option.

Where identified on a site specific basis, slash treatments will be designed to:

- Retain some small slash piles unburned to provide habitat for small mammals.
- In regeneration units - create piles of logs, stumps, or other woody debris to minimize the effects of larger openings and to provide connectivity to adjacent stands for lynx, marten, and other species that may generally avoid open areas and utilize concentrations of down wood for foraging or denning.
- Maintain large diameter downed logs in various stages of decomposition within harvest units (50 linear feet/acre of 10 inches diameter or larger at the large end of lodgepole pine and aspen logs and/or 12 inches diameter or larger for spruce and fir logs) to provide habitat for small mammals.

**Post-sale Activities**

The Knutson-Vandenburg (KV) Act authorizes the Forest Service to collect money from timber sales for resource enhancement, protection, and improvement work in the timber sale area. Additionally, the stewardship contracting authority or directly appropriated Agency funding may be used to complete post-sale activities. Post-sale activities are identified in silvicultural prescription and may include the following activities:

- Pre-commercial thinning, release and weed cleaning: Thinning of stems 0-5 inches DBH; intensity varies due to treatment objective, stand density and overstory conditions. Included slash treatment may be lop and scatter, chipping, or removal to a landing where tops may be burned.

- Regeneration surveys 3rd and 5th year post-harvest: Monitoring will determine if Forest Plan stocking standards are met for regeneration treatments (CC, coppice, SWSS LP, SWSS DF, GS, Fuelbreak GS, Patch Cut – strips, SEL, OR, and mistletoe control).

- Aspen sprout fencing: Construct fencing to protect aspen sprouts from livestock and wildlife browsing. This activity may be needed for certain aspen coppice or group selection treatments where excessive browsing damage is occurring. Treatment units will be monitored to determine the need for fencing. All fence material will be removed from the site once successful stocking levels are reached.

- Site preparation: Mechanical scarification or prescribed burning to expose mineral soil for conifer establishment. Mechanical soil scarification would expose a mineral soil seed bed on up to 40% of the treatment area using heavy equipment. Sites would be identified for this treatment where conifer regeneration is an objective for the prescription and an adequate mineral soil seed bed is not present. Site preparation could apply to the CC, BC restore, SWSS LP, SWSS DF, GS, Fuelbreak GS, Patch Cut – strips, OR, or mistletoe control treatment prescriptions.

- Removal of encroaching conifer from parks and meadows: Treatment (removal) of conifer encroachment into parks, riparian areas and meadows will occur. These treatments will occur in high priority areas and will involve burning or cutting and/or girdling small trees with hand tools. No wood removal will occur, and all activity-created material would be lopped and scattered.

- Noxious weed treatment and monitoring: Monitor and treat (as needed) noxious weed populations following all ground disturbing activities.

### *2.1.2. Alternative 2 –Economic Viability*

The “Economic Viability” alternative is designed to meet the purpose and need for the project as stated in Chapter 1 using a modified proposal that is intended to address the concerns identified in Key Issue 4 (Chapter 1) related to economic viability. Certain units in the Home Gulch, Monchego Creek, Ant Creek and Archuleta Creek watersheds would be treated with fire or eliminated from consideration. Emphasizing prescribed fire as a tool in these less economical areas will eliminate the need for road improvements to allow hauling of wood products at a commercial level, and 19 miles of road work (new construction, re-construction and decommissioning) would be eliminated from the proposal. This alternative will minimize the financial burden associated with the high costs of road improvements in areas where the timber value is marginal.

Alternative 2 includes a variety of mechanical and prescribed burning vegetation treatments on approximately 11,440 acres. Mechanical treatments are proposed for approximately 4,104 acres and include both commercial and non-commercial operations. Prescribed burning would occur on 7,336 acres (Table 6). The location of these treatments is displayed on Map 4 in Appendix A. Stewardship opportunities through which the Forest Service exchanges goods for services may also be allowed under this alternative.

To facilitate the treatments described above, an estimated 1.4 miles of NFS road would need to be re-routed (i.e. new road template built) and 2.7 miles of existing road would require improvements

(reconstruction). This alternative would also require the use of approximately 16.2 miles of existing NFS road that would require some level of preparation, which could range from minimal maintenance activities (pre-use maintenance) to minor reconstruction of the road template, depending on the current condition of the road.

Treatments proposed under Alternative 2 are summarized in Table 6 and described in detail below. Figures are approximate.

Table 6. Vegetation Treatment Activities of Alternative 2

<b>Treatment</b>	<b>Acres</b>
<b><i>mechanical treatments</i></b>	
Aspen coppice (clear cut)	106
Bristlecone pine thinning	31
Clearcut	122
Fuel break -group selection	184
Fuelbreak - patch cuts	29
Group Selection	2,557
Mistletoe control strip cut	38
Overstory removal	209
Patch cut (old strips)	71
Pine & Douglas-fir thinning (restoration)	360
Pole thinning	121
Poles - clearcut	53
Poles thinning with Aspen patch cuts	27
Shelterwood seed step - Douglas-fir	36
Shelterwood seed step - lodgepole pine	130
Uniform Selection	30
<b>Total</b>	<b>4,104</b>

<b><i>prescribed burn treatments</i></b>	
Maintenance burn Douglas-fir/ponderosa pine	1,717
Rangeland maintenance improvement burn	4,143
Mixed Conifer management burn	1,439
Aspen Burn	37
<b>Total</b>	<b>7,336</b>

Potential wood products that could be generated from treatment activities include: saw timber, fuelwood, posts, poles, mine props, house logs and woody biomass. It is estimated that 20,547 CCF of sawtimber, 1,242 CCF of posts, poles and mine props, and 15,922 green tons of woody biomass (*assume 2 green tons per CCF*) will be produced through implementation of this alternative.



In addition to the silvicultural activities listed above, mechanical treatment of conifer encroachment into riparian areas and meadows will occur at some sites within the planning area. These treatments will involve cutting or girdling small trees with hand tools, and will not include wood removal.

### **Proposed Vegetation Treatments**

In Alternative 2, all but one of the vegetation treatment prescriptions are identical to those described for Alternative 1. Alternative two includes an additional mixed conifer management burn prescription. This new prescription is designed to mimic the results of the group selection prescription in the cool moist mixed conifer forest type by creating a mosaic stand structure, and pockets of tree regeneration and will be applied to 1,439 acres (Table 6, and Map 4 Appendix A). This treatment is described below. The other prescriptions are described in the Alternative 1 section above and are not reproduced here.

#### Mixed conifer management burn *P burn - MC, (1,439 acres)*

Use a mixed intensity burning prescription to regenerate pockets of conifer and aspen using stand replacing fire, and reduce fuel loadings and stand density using low intensity surface fires. The results of this treatment will be a mosaic of 40% of the area in pockets of stand replacement, and 60% of the area experiencing a fuel and tree density reducing surface fire. Mechanical pre-treatment may be necessary in certain units where fuel loading is high to avoid extreme mortality or unwanted stand replacing fire behavior. Pre-treatment would mainly consist of rearrangement of fuels, but could include removal of biomass and wood products in certain units where equipment access is available.

### **Road Use and Management Activities**

Road use by the public is controlled through the recently adopted Gunnison Travel Management Plan. This plan identifies approved travel routes and modes of acceptable travel. The existing roads that are no longer open to public travel and will be decommissioned from the National Forest Road System are also identified. Most of the roads specified for decommissioning within the Cochetopa Hills planning area will not be used for accessing treatment units. However, there are some decommissioned segments that will be needed for hauling wood products. These segments are short extensions and “spur” roads that connect to open roads and total 2.3 miles over the planning area under Alternative 2 (Map 5, Appendix A). These roads will be physically closed after wood hauling and treatment activities are complete. If needed, signing may be used to prevent public use while treatments are being implemented.

The driving issue for the development of Alternative 2 is the high cost of road construction and re-construction needed to allow for commercial scale wood product removal from areas with marginal timber value. As such, the roads requiring substantial work in the southwestern portion of the planning area, as well as certain other areas, were removed from the proposal under Alternative 2 (Map 5 Appendix A). This change resulted in a reduction of 19.1 miles of road work (all categories) as compared to Alternative 1. Table 7 reports the length of planned haul roads by the type of work needed to facilitate vegetation treatments. The location of these roads is displayed on Map 5 of Appendix A.

Table 7. Planned Haul Roads Reported by Expected Work Needed to Allow Hauling – Alternative 2

<i>Forest Roads (not county or state)</i>	
<b>Work Description</b>	<b>miles</b>
standard maintenance	20
decommission road segment, due to re-route	0.7
upgrade existing road to minimum haul specifications	2.7
maintain and/or reconstruct existing haul roads	16.6
new construction for re-route/extension	1.4
open administratively closed routes to haul specifications	11.2
<b>Subtotal (forest roads)</b>	<b>52.6</b>
<i>County Roads &amp; Highway 114</i>	
<b>Road Name</b>	<b>miles</b>
COCHETOPA PARK (Archuleta cut off)	5.3
SAGUACHE COUNTY RD NN-14	16.6
SAGUACHE COUNTY ROAD 17-FF	2.2
SAGUACHE PARK	6.0
STATE HWY 114	13.9
<b>Subtotal (county &amp; state roads)</b>	<b>44.1</b>
<b>Grand total</b>	<b>96.7</b>

Road maintenance on the county roads and Highway 114 within the planning area is performed by county and state crews on an ongoing basis, and would not represent new activities under this proposal. Additionally, 20 miles of NFS road would require only routine maintenance. The road work categories are identical to those described in Alternative 1; therefore, a detailed description is not reproduced here (refer to the Alternative 1 section).

### Post-Treatment Transportation Management

The Gunnison National Forest recently issued a decision on a new travel management plan which has been in effect since the fall of 2010. This plan specifies which routes are open for public travel and the modes of travel that are allowed on those routes. Allowable uses of existing NFS roads within the Cochetopa Hills project area are subject to the direction in this Forest-wide travel management plan. All existing roads that are identified for closure in the travel management plan, and are planned for wood removal use under Alternative 2 (see “Road Management Activities” section above) will be physically closed after treatment operations are complete. All temporary haul roads needed for Alternative 2 will

be closed following treatment activities and will not be part of the motorized use network. The newly constructed segment in the Pine Creek basin (NFSR 878.1B) will be added to the transportation system without changing the mode of travel or level of public access (Appendix A, Map 5).

All administratively closed roads will keep this designation and be closed to the public when operations are complete.

### **Continental Divide National Scenic Trail (CDNST)**

A large proportion (65%) of the CDNST within the Cochetopa Hills planning area is located on open, full-sized motor vehicle roads. Another 20% of the trail length is located on administratively closed timber hauling roads. Under Alternative 2, a total of 16.39 miles of roads are needed for hauling wood products that are co-located with the CDNST or where trail is adjacent to treatment units (Map 3, Appendix A). Of this total road length, 3.93 miles are located on administratively closed (gated) timber haul roads that currently exhibit a “single track” trail character and are closed to full-sized motor vehicle use by the public (agency use is authorized). If trail miles within units are also included (.74), then under Alternative 2, a total of 17.13 trail miles are affected.

### **Harvest Systems**

The specific harvest system to be employed for any given area to be treated would be determined at the time of layout. The harvest system selected will be based on topographical considerations, acceptable levels of residual fuels within stands, and soil nutrient requirements. Past experience indicates that whole tree yarding is likely to be used for the larger sized timber sales (> 4,000 CCF).

### **Activity Fuels, Course Woody Debris (CWD) and Slash**

The treatment of activity fuels, CWD and slash proposed in Alternative 2 is identical to the proposed action (Alternative 1). Please refer to the description provided in the Alternative 1 section contained in this chapter.

### **Post-sale Activities**

The post-sale activities proposed in Alternative 2 are identical to the proposed action (Alternative 1). Please refer to the description provided in the Alternative 1 section contained in this chapter.

### 2.1.3. *Alternative 3 – No Action*

NEPA requires the study and use of the no action alternative as a basis for comparing the effects of the proposed action and other alternatives.

The no action alternative assumes that none of the elements of the proposed action would take place in the Cochetopa Hills project area. Under this alternative, no attempt is made to actively respond to the purpose of and need for action or the issues brought forth during scoping. Vegetation management would not take place unless authorized by other decisions. Vegetation structure would change over time through natural growth and mortality and events such as wildfires, storms, and insect or disease outbreaks. The existing road network as defined under the Gunnison Travel Management Plan would persist until modified by future decisions. Activities authorized under previous NEPA analyses would continue. Routine activities not tied to this analysis such as scheduled road maintenance, treatment of noxious weeds, livestock grazing, public fuelwood cutting and fire suppression would also continue.

### 2.1.4. *Treatment Timing (All Action Alternatives)*

Treatments proposed under Alternative 1 and Alternative 2 would be conducted in a series of timber sales, service contracts, public wood permits and “in-house” Agency projects implemented over a period of ten years. Logical operational delineations such as haul route networks, skidding breaks and desired treatment scale will be used to determine project size, location and timing.

### 2.1.5. *Comparison of Alternatives*

Under the NEPA process, the public and the agency decision maker compares the alternatives based on whether or not they achieve the purpose and need for action and the resulting environmental effects. Table 8 below provides a comparison of the activities associated with each of the proposed alternatives. Additionally, Table 9 compares the effects on key issues of each alternative, and is followed by an assessment of the effectiveness of each alternative at meeting the purpose and need for the project. An analysis of the environmental effects is presented in Chapter 3.

Table 8. Comparison of Actions and Outputs of Alternatives

Vegetation Treatment	Alternative	
	Alt 1 (acres)	Alt 2 (acres)
Aspen Burn	37	37
BC restore	31	31
CC	144	122
coppice	244	106
Fuelbreak - GS	184	184

Vegetation Treatment	Alternative	
	Alt 1 (acres)	Alt 2 (acres)
Fuelbreak - patch	29	29
GS	3,857	2,557
Mistletoe control	38	38
OR	209	209
P burn (DF/PP)	1,717	1,717
P burn (MC)	0	1,439
P burn (range)	4,143	4,143
Patch cut - strips	71	71
Pole thinning	121	121
Poles - clearcut	53	53
Poles - thin/AS	27	27
PP/DF restore	724	339
PP/DF restore (BLM)	21	21
Sel	30	30
SWSS DF	47	36
SWSS LP	130	130
<b>Total</b>	<b>11,857</b>	<b>11,440</b>
Mechanical vs Burn Treatments	Alternative	
	Alt 1 (acres)	Alt 2 (acres)
mechanical	5,960	4,104
prescribed burn	5,897	7,336
Wood Products	Alternative	
	Alt 1 (CCF)	Alt 2 (CCF)
sawtimber	25,326	20,547
posts, poles & mine props	1,242	1,242
biomass - green tons	35,618	15,922
Transportation System	Alternative	
	Alt 1 (miles)	Alt 2 (miles)
total haul roads	118.8	96.7
road segments to decommission (due to re-route)	2.5	0.7
roads to decommission (due to Gunnison Travel Plan)	4.6	2.3
new re-routed/extended roads	4.7	1.4
roads needing major re-construction	14.6	2.7
roads needing minor re-construction	17.8	16.6
roads to open (admin. closures)	11.2	11.2
<b>Continental Divide National Scenic</b>	<b>Alternative</b>	

Vegetation Treatment	Alternative	
	Alt 1 (acres)	Alt 2 (acres)
Trail	Alt 1 (miles)	Alt 2 (miles)
co-located with open, full sized motor vehicle road to be used for hauling	12.78	12.46
co-located with administratively closed timber haul road to be used for hauling	3.93	3.93
Trail miles within units	.74	.74
total trail miles affected	17.45	17.13

Table 9. Comparison of Project Alternatives Based on Key Issues

Key Issue #1: Forest Condition	Alternative	
	Alt 1	Alt 2
Aspen: Proportion of seral stages, early seral (current proportion 3%)	6%	6%
Aspen: Proportion of seral stages, mid-seral (current proportion 24%)	23%	23%
Aspen: Proportion of seral stages, late seral (current proportion 72%)	71%	70%
Lodgepole pine: Proportion of seral stages, early seral (current proportion 3%)	4%	4%
Lodgepole Pine: Proportion of seral stages, mid-seral (current proportion 19%)	19%	19%
Lodgepole Pine: Proportion of seral stages, late seral (current proportion 78%)	76%	76%
Spruce/Fir: Proportion of seral stages, early seral (current proportion 2%)	3%	3%
Spruce/Fir: Proportion of seral stages, mid-seral (current proportion 10%)	10%	10%
Spruce/Fir: Proportion of seral stages, late seral (current proportion 88%)	88%	88%
Acres of reduced bark beetle risk rating: lodgepole pine	1100	1058
Acres of reduced bark beetle risk rating: spruce-fir	294	613
Acres of regeneration treatment (coppice, clearcut, group selection, selection)	5,960	4,104
<b>Key Issue #2: Economic Viability of</b>	<b>Alternative</b>	

Proposed Treatments	Alt 1	Alt 2
Benefit-to-Cost Ratio	1.49	0.6

### Assessment of Effectiveness of Project Alternatives Based on Purpose and Need

#### Purpose and Need Element 1: Create/maintain Forest Age Class and Species Diversity within the Landscape

Under Alternative 1, approximately 11,857 acres will be treated through a combination of mechanical treatments (5,960 acres) and prescribed burns (5,897 acres). Under Alternative 2, approximately 11,440 acres will be treated in all, with 4,104 acres as mechanical treatments and 7,336 acres as prescribed burns. Alternative 1 treats 417 acres more than Alternative 2, however, an additional 19 miles of road work is required. Alternative 2 employs fewer acres of mechanical treatments (1,856 acres less than Alternative 1) and treats 1,439 more acres as prescribed burns. The additional mixed conifer management burn included in Alternative 2 is expected to regenerate pockets of conifer and aspen and create a mosaic stand structure.

Both alternatives use nearly identical treatments for vegetation management (see table 8 for a comparison of the alternatives.) Silvicultural treatments are proposed according to their effectiveness at regenerating aspen, lodgepole pine, spruce-fir, spruce-fir/aspen, mixed conifer and bristlecone pine forest types. Under both alternatives, a mixture of mechanical treatments and prescribed burning will reduce stand densities, initiate new growth, and promote large, remnant ponderosa and Douglas-fir tree retention in the dry mixed conifer and ponderosa pine forest type, increasing age class diversity and forest health.

Vegetation management in the Cochetopa Hills planning area also presents the opportunity to improve wildlife habitat. A Canada lynx linkage corridor has been identified within the planning area. Although care must be taken during silvicultural treatments to avoid negatively impacting lynx and other species, treatments also present the opportunity to maintain and improve lynx habitat. Both alternatives include prescriptions to maintain and increase Canada lynx denning habitat within the corridor through slash piles and woody debris, as well as creating habitat for snowshoe hare, their main prey. Each alternative has equal potential for improving wildlife habitat and species diversity.

#### Purpose and Need Element 2: Protect Forests from Insects, Diseases, and Wildfires

Under each alternative, the proposed silvicultural treatments are expected to improve resilience to insects, disease and wildfire; Alternative 1 treats a larger area. Under both alternatives, group selection treatments will focus on removing diseased and damaged trees as well as mature or declining aspen and lodgepole pine. Mistletoe control strips and clearcuts will be used to remove all lodgepole pine trees within known dwarf mistletoe areas surrounding recently regenerated harvest units. Controlled burns will help remove ladder fuels and dead fuels. Under both alternatives, silvicultural treatments will increase stand resistance and resiliency to spruce beetle infestations, as well as white pine blister rust. Alternative 1 is expected to produce the largest reduction in bark beetle risk in the lodgepole pine cover

type, with a 595 acre increase in area of low risk rating for mountain pine beetle. Alternative 2 is expected to create an additional 471 acres of low risk rating for mountain pine beetle within the lodgepole pine cover type (see Table 9).

#### Purpose and Need Element 3: Provide Wood Products Now and in the Future

Both alternatives employ commercial treatments as part of the vegetation management plan, including commercial timber sales. More acres are mechanically thinned under Alternative 1 (417 acres), meaning there is an increased opportunity for timber sales. However, the mechanical treatments that are eliminated in Alternative 2 (units in Home Gulch, Monchego Creek, Ant Creek and Archuleta Creek watersheds) are in areas where timber value is lower and the cost of road improvements is high, making Alternative 2 more economical. As mentioned above, an additional 19 miles of roadwork is required under Alternative 1. Specific harvest systems would be determined at the time of layout and adhere to the Forest Plan. Both alternatives use the same vegetation treatments to encourage new growth and produce productive stands for future harvesting.

#### Purpose and Need Element 4: Protect and Enhance Range Resources

Alternatives 1 and 2 employ the same treatments for improving range resources. Trees encroaching into rangelands will be removed. Controlled burns will be used to maintain open parks and meadows and treatments will be applied to increase growth of existing grasses and forbs.

#### *2.1.6. Alternatives Considered, but Eliminated from Detailed Study*

Two alternatives to the proposed action and the Economic Viability alternative were considered by the interdisciplinary team. These alternatives included:

- Greater goshawk protection ( $\frac{1}{2}$  mile versus  $\frac{1}{4}$  mile nest buffers).
- Restrict wood product hauling activities to the winter season within areas where the CDNST is located along the haul route (Pine Creek, Corduroy, Monchego, Lujan). This would minimize direct contact of trail users with wood transport vehicles.

The goshawk protection alternative was dropped from consideration because the ID team decided to evaluate the need for this on a site-specific basis and incorporate it as design criteria under both alternatives for units where analysis determines it is needed.



### 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

#### 3.1. Introduction

This section describes the affected environment and discloses the potential effects of the proposed action and each alternative. It forms the scientific and analytical basis for the comparison of the potential environmental effects of the alternatives. In determining potential environmental consequences of each alternative, the IDT considered the following:

- The probable consequences of each alternative on environmental resources (particularly Key Issues).
- Achievement of the stated purpose and need for the project.
- Adherence to Forest Plan standards and guidelines.
- Compliance with Federal and State laws and regulations.

#### 3.2. Summary of Analysis

The following table summarizes the major findings for each resource area. A complete analysis is given later in this chapter, as well as a description of past, present and foreseeable future activities. The proposed treatments are expected to be implemented over the next ten years.

Table 10. Comparison of Existing Conditions and Effects of Proposed Treatments

Acronyms: *HSS* ( *Habitat Structural Stage*); *BMP* ( *Best Management Practices*); *MU* ( *Map Units* )

Resource Area	Existing Conditions	Direct & Indirect Effects		Cumulative Effects
		Alt. 1	Alt. 2	
<b>Forest</b>	All forested cover types are advanced in age with medium density. The aspen, lodgepole pine and spruce/fir forest types are under-represented in the early seral successional stage, and overabundant in the late seral successional stage. The older condition of forest stands, high density and lack of biological diversity increase the risk of bark beetle infestation; 62% of the area across all cover types is classified with a high risk rating 36% is classified with a moderate risk (98% as high or moderate).	<i>Changes to HSS: 2,908 acres move from class 4B &amp; 4C to 4A, 3A will increase to 1,138 acres</i>	<i>Changes to HSS: 2,805 acres move from class 4B &amp; 4C to 4A, 3A will increase to 1,841 acres</i>	Alt. 1: 5,960 acres mechanical harvest; 5,897 acres prescribed fire, with 616 acres in high impact, stand replacing activities.
		<i>Bark Beetle Risk: Decrease of 2,345 acres from the high risk category</i>	<i>Bark Beetle Risk: Decrease of 2,613 acres from the high risk category</i>	Alt. 2: 4,104 acres mechanical harvest; 7,336 acres prescribed fire, with 456 acres in high impact, stand replacing activities.
		<i>Acres of Regenerated Stands: 616</i>	<i>Acres of Regenerated Stands: 456</i>	Proportion of seral stages is expected to show minor improvement under each alternative.
<b>Range</b>	Six allotments fall within the project area with varying grazing seasons. Livestock grazing is	Prescribed fire may disrupt grazing	Prescribed fire may disrupt grazing	No negative cumulative effects are anticipated. Positive effects include

	exclusive to cattle. There is a total of 47.7 miles of fence in the project area, and 15 grazing improvements including water systems and dam structures.	temporarily. Treatments will likely increase desirable forage long-term. Alternative 1 may increase forage resources by 3%, mainly in transitory range.	temporarily. Treatments will likely increase desirable forage the long-term.	increases in the amount of forage, improved access to available forage, and greater opportunities for livestock distribution.
<b>Soil</b>	Two soils account for 60% of the MU. Goosepeak dominates the southern portion of the area; Goospeak-Snowden dominates the north.	Slight to moderate erosion risk	Slight to moderate erosion risk	Estimated extent of disturbance is less than 10% of forested lands. No widespread impairment to soil resources expected.
<b>Watershed</b>	Three sub-watersheds in area: Archuleta Creek, West Pass Creek, and headwaters of Razor Creek. Peak runoff in mid-May and August. Average annual precipitation: 11 inches. Class 1 and Class 2 water quality standards are attained. Archuleta and West Pass Creek road densities are currently between 1-2.4 mi/mi <sup>2</sup> , considered a functioning at risk condition based on National Watershed Condition Classification. Headwaters of Razor Creek currently in properly functioning condition. Approximately 2,000 acres of riparian area were identified.	<i>Road Construction:</i> 2.3 miles of new road in Archuleta Creek and 2.4 miles of road in West Pass Creek.	<i>Road Construction:</i> 1.4 miles of road in West Pass Creek	Minimal effect on water quality if BMPs are followed.  Road densities will not increase to a level that will alter the functioning condition of the three creeks.
		<i>Canopy Removal:</i> 10.1% in Archuleta Creek, 8.8% in West Pass Creek, 1.5% in upper Razor Creek  <i>Percentage of Riparian Area Affected:</i> Archuleta Ck, 24.4%, West Pass Ck, 4.2%, Razor Ck, .04%	<i>Canopy Removal:</i> 10.4% in Archuleta Creek, 8.0% in West Pass Creek, 1.5% in upper Razor Creek  <i>Percentage of Riparian Area Affected:</i> Archuleta Ck, 24.4%, West Pass Ck, 2.5%, Razor Ck, .04%	Since less than 15% of canopy removal is planned, no significant change in annual watershed yield is expected.  Follow BMP to assure riparian wetland and riparian features maintain their function on the landscape.
<b>Wildlife</b>	Proposed treatment units include 5,164 acres of currently suitable lynx habitat within the Cochetopa and Needle-Razor	Lynx: Temporary displacement of lynx; 297	Direct and indirect effects for all species analyzed will	Treatment activities will affect habitat quality in the short term, but will not

	LAUs. A portion of the project area also overlaps the North Pass-Cochetopa Hills lynx linkage area. Wildlife species that occur in lodgepole pine habitat type include northern goshawks, (nesting habitat), deer and elk, several woodpecker species, and snowshoe hare. Aspen forests provide habitat for a variety of mammal and birds species. Spruce-fir stands provide high quality denning, foraging and dispersal habitat for Canada Lynx.	acres (0.8%) of suitable habitat changed to a Stand Initiation Structural Stage. Alt. 1 treats 1,107 acres of LLA and impacts 3% of linkage. Design criteria will maintain connectivity. Alt. 1 results in more of a mosaic of habitat types than Alt. 2.  Effects to all species include temporary displacement due to management activities and changes in habitat structure and habitat quality.	be the same as described for Alt. 1 except at a smaller magnitude. Alt. 2 treats fewer acres and would have fewer temporary roads. Treatment activities are essentially the same.	result in a permanent loss of habitat. The proposed project will benefit species and their habitat in the long term by improving the health of forested stands, promoting regeneration and lowering the risk of a stand replacing fire. Design criteria will avoid or minimize negative effects. Currently, 345 acres (1.4%) are unsuitable lynx habitat. Under the proposed action, an additional 262 acres (1.0%) will become unsuitable, resulting in a total of 607 acres (2.4%) of unsuitable habitat.
<b>Fisheries</b>	Approximately 1.83 miles of perennial streams intersect the proposed vegetation treatments within the project area, including sections of Lujan Creek (0.17 miles) and Monchego Creek (1.66 miles). There are less than 2 miles of fish-bearing streams within the project area. Species potentially affected: Brook trout, brown trout, rainbow trout. Bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker reside in rivers downstream from the action area.	Potential indirect effects include sedimentation from slopes where harvest has occurred and increased stream temperature if timber is removed in riparian areas. No new culverts constructed.	Potential indirect effects include sedimentation from slopes where harvest has occurred and increased stream temperature if timber is removed in riparian areas. No new culverts constructed.	Required BMPs and project design elements will protect riparian habitat and prevent sedimentation and increased water temperatures, and lessen the chance of negative impacts. Project may temporarily displace or alter how individuals use affected habitats, but will not result in a change in population numbers or trends at Forest scales.
<b>Botany</b>	There are no Threatened, Endangered, or Proposed plants found on the Gunnison Ranger District, or on adjacent land.	Potential direct effects to Colorado tansy-aster	Potential direct effects to Colorado tansy-aster	Project design criteria will minimize effects to Colorado tansy-aster. Both

	Fourteen Forest Service Sensitive plant species have been found on the Gunnison Ranger District and surrounding lands. Of these, potential habitat exists for seven species in the project area. One FSS species was identified growing in the planning area (Colorado tansy-aster).	includes loss of plants growing in roads subject to improvement, and mortality in parking areas. Nine populations, four sub-populations and 170 individuals potentially impacted. Other impacts include parking on plants near mechanical treatment units and damage by burns.	includes loss of plants growing in roads subject to improvement, and mortality in parking areas. Nine populations, one sub-population and 40 individuals potentially impacted. Other impacts include parking on plants near mechanical treatment units and damage by burns.	Alternatives may adversely impact individuals, but is not likely to result in a trend toward Federal listing.
<b>Recreation</b>	Recreational activities include OHV use, mountain biking, hiking, backpacking, horseback riding, big game hunting, firewood gathering and dispersed camping. Big game hunting during the Fall and Winter months provides economic stimulus to local communities.	Primary consequences are visual effects from vegetation treatments and increased logging traffic and noise. Recreational activities may transition to other locations during treatment; no net loss in recreational activity to the local economy.	Primary consequences are visual effects from vegetation treatments and increased logging traffic and noise. Recreational activities may transition to other locations during treatment; no net loss in recreational activity to the local economy.	Measures to mitigate visual impacts will help to reduce the cumulative effects. Logging traffic and noise would add to the impacts of this project. Outreach and education on the benefits of timber harvest activities would help inform visitors of management objectives. Post treatment conditions are expected to provide for better ecological conditions, greater public safety and improved recreational opportunities.
<b>Economic Costs &amp; Opportunities</b>	The study area (Saguache County, Colorado) has a limited economic base. Important sectors include logging and wood products, recreation and	Non-market benefits could include improved ecosystem	Non-market benefits could include improved ecosystem	This project, in conjunction with other simultaneous resource projects, is expected to create new jobs that

	<p>tourism. Government employment is the largest employer, followed by Farming. The population in 2012 was 6,304. Between 2000 and 2012 Saguache County experienced a modest growth rate of 7 percent, compared to 21% in the rest of the state. In recent years Saguache County has trended towards poorer conditions. In April 2013, unemployment was at 8.9 percent. The median annual household income in 2011 was \$33,672 and the percentage of persons below the poverty line was 25.3%. Two minority populations that could meet Environmental Justice criterion are American Indian and Hispanic.</p>	<p>health, improved safety, more recreation opportunities, and reduced threat of fire. Commercial timber sale and restoration activities would generate jobs and could have a ripple effect through the local economy.</p>	<p>health, improved safety, more recreation opportunities, and reduced threat of fire. Commercial timber sale and restoration would generate jobs and could have a ripple effect through the local economy. Additional measures will maximize financial benefits and decrease project costs.</p>	<p>could be filled by unemployed residents. This would contribute to decreased unemployment and increased household income.</p>
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There are seven major forested cover types within the Cochetopa Hills planning area (Figures 3 and 4), as well as a large component of open parks and meadows. An analysis of the current condition of forested cover types reveals a high proportion of mature trees with a dense overstory. Forest health was measured by studying the Habitat Structural Stage (HSS), current conditions vs. historic range of variability, and bark beetle risk. A study of the HSS revealed that the general condition of all forested cover types within the planning area is advanced in age with a medium density (40% to 70% canopy cover) HSS class B (see Table 12). The data also showed a lack of age-class diversity; only 119 acres are within the HSS size class 2, seedlings and small sapling stage (Table 12 and Figure 5). Based on field data measured in 2009, it is estimated that 80% to 90% of the stands within the planning area are over 150 years of age, and many are over 200 years of age. In addition, data on successional seral stages showed that aspen, lodgepole pine and spruce/fir forest types are under-represented in the early seral stage, and overabundant in late seral stage (see Table 15). These conditions put the Cochetopa Hills project area at risk for bark beetle infestation, disease and high intensity wildfire.

Treatments present opportunities to improve forest health and wildlife habitat and achieve Forest Plan goals. Silvicultural treatments can decrease stand densities, promote age class diversity and reduce vulnerability to damage from insects and disease. Wildlife habitat can also be improved, including habitat for snowshoe hare, the main prey of the Canada Lynx. Other positive impacts include economic opportunities for the community through commercial timber sale and restoration activities, which would generate jobs and income for the local communities.

Each of the proposed alternatives has the potential to have some negative impacts as well, particularly in fisheries and watersheds. Timber removal on hillslopes could cause erosion resulting in sedimentation in streams. Roads constructed for timber removal have the potential to increase runoff and alter hydrologic processes. However, new road construction is limited and no new culverts will be constructed, so road impacts are expected to be minimal. Furthermore, long term benefits will occur where the segments of these new roads are relocated away from their existing location in riparian areas, and poor alignments on the hillslopes. Another area of concern is canopy removal. Canopy removal in riparian habitat could increase stream temperatures; removal along stream banks should be avoided. Canopy removal of more than 15% in a watershed also has the potential to alter hydrologic processes and affect annual watershed yield. The greatest amount of canopy removal being proposed is 10.4% in Archuleta Creek. At this level no significant change in annual watershed yield is expected.

Impact on soil is minimal; there is a slight to moderate risk of erosion. Recreation may be impacted by increased logging traffic and noise, as well as the visual impacts of logging operations. Populations of Forest Service Sensitive plant species Colorado tansy-aster may be impacted by road improvements, parking areas and prescribed burns, but is not likely to result in a loss of viability.

Regardless of which alternative is chosen, following best management practices as described in the regionally adopted Watershed Conservation Practices Handbook (US Forest Service, 2006) and adhering to direction in the GMUG Forest Plan (USFS, 1991) should mitigate the effects of the proposed treatments on fisheries, watersheds and other resource areas.

### 3.3. Past, Present and Reasonably Foreseeable Future Activities

A number of activities have already occurred, are occurring or are planned in the Cochetopa Hills project area. Past activities have contributed to the existing condition of resources as described in this chapter. Ongoing and future activities may contribute to effects on resources that would also be affected by the proposed project. The need to include these activities in the cumulative effects section of each individual resource analysis depends on the extent of the cumulative effects analysis area and the duration of effects on each resource. Future activities described in this section are not part of the decision to be made for this EA. Most have already been approved by other decisions or would require separate environmental analysis and public involvement.

#### 3.3.1. *Past Activities*

The Cochetopa Hills project area has had a long history of human use and influence. Native Americans visited the area for hunting and likely used fire as a vegetation management tool. Because of their lower peaks, the Cochetopa Hills historically served as a crossing over the Continental Divide by both Ute Indians and early Spanish explorers, and it is speculated that traders may have visited the area as early as 1640. In 1765, Juan Rivera and his men came to Southwest Colorado in search of gold, and some reports have them traveling through the Cochetopa Pass. In the 1820s and 1830s, trappers and traders

traveled through the Cochetopa Hills on their way to Gunnison Valley. (O'Rourke, 1992; Simmons & Simmons, 2001). Since the onset of Euro-American settlement (1870), homesteading, ranching, and logging have influenced the vegetation and wildlife within the landscape. Timber harvesting has been recorded as early as 1900 in the planning area at a low level. Harvesting operations increased in scale after the mid 1940's, but have remained a relatively small portion of the total land area (3% to 7% per decade on a watershed basis). Fire suppression was instituted in the early 1900's, and has had a significant influence on the condition of the vegetation within the planning area. An active prescribed burning program has been implemented since the early 1980s with an average of 297 acres of burning per year. Recently, this program has including the use of wildfire for resource benefits (52 acres in 2007). Prescribed burning has mainly occurred in the shrub and grass vegetation types, and has had only a minor influence on the forested vegetation of the planning area.

### **Grazing**

Livestock grazing began in the Cochetopa Hills area in the 1870s (O'Rourke, 1992) when herds of shorthorns were driven through southwestern Colorado. Cattle ranching was a booming industry in the area into the 1900's; large herds were grazed in the Montezuma Valley, Gunnison county, and along the north fork of the Gunnison River (O'Rourke, 1992). By the turn of the century, cattle grazing was reduced to smaller scale operations. Factors included overgrazing, competition for land with homesteaders and farmers, the creation of National Forest Reserves and increased regulation. The growing sheep industry also affected cattle grazing, though it is unclear whether sheep were grazed in the Cochetopa Hills planning area. Grazing continues in the Cochetopa Hills today, but on a much smaller scale.

### **Noxious Weeds**

Herbicide application has occurred in various locations, mainly along roads and at other areas of soil disturbance related to past management activities. Weed control is authorized under a Forest-wide EA that allows the use of herbicides, with certain restrictions. While all restrictions are routinely followed, those most pertinent to this project are described below:

#### **Environmental Assessment: Taylor River-Cebolla District Noxious Weed Management Program**

- A. Mitigation measures (pp. 4-5 of the EA)
  3. Favor selective over broadcast treatments and chemicals with normal half-lives of under three months. Apply herbicides at the lowest effective rates, and as large droplets to reduce drift.
  4. Use buffers around water sources, lakes, wetlands, streams, and sinkholes to prevent herbicide water pollution. Design buffer width to keep herbicide concentrations well below those harmful to drinking, irrigation, aquatic life, and non-target vegetation. Clearly mark buffers before treatment so applicators can easily see and avoid them. Use only aquatic-labeled herbicides within buffers.
  7. Crew supervisors, Contract Officer Representatives (CORs), and herbicide applicators must be state certified herbicide applicators.
  9. Herbicide treatments in suspected berry, mushroom, or other edible plant gathering sites, as well as recreation sites, will be timed to allow the herbicides to degrade naturally before the gathering or use season begins.

(Dawson, James R. 1995; Taylor River-Cebolla Ranger District. 1995)

**Private Land In and Around the Project Area**

Development of land, water developments, limited timber harvest and other activities have occurred on private lands within the planning area. Site specific data are not available for these activities. Development has remained mostly ranching based with very low densities of houses and other structures on the private land parcels.

**Recreation**

Recreational activities such as hunting, fishing, hiking, biking, ATV/motorcycle riding, wood cutting and camping have occurred in the Cochetopa Hills project area for several decades. Dome Lakes State Wildlife Area is popular for fishing and has historically experienced moderate yearly visitor numbers. Additionally, the project area includes 24 miles of the Continental Divide National Scenic Trail (CDNST). Nationally, this trail is primarily intended for non-motorized recreation, but within the Cochetopa Hills planning area it includes only one 4-mile segment with a strictly non-motorized designation. Historical use on the remaining (motorized) segments of the trail has been limited to incidental vehicle use - mainly for hunting, camping or firewood cutting by the public. Periodically, log hauling from timber sales and fuel reduction service contracts has occurred on roads co-located with the CDNST.

Some snowmobiling, snowshoeing and back country skiing has occurred in the planning area, but has not developed into prominent use.

Numerous outfitter and guide services operate within the Cochetopa Hills project area including a guest ranch (the Quarter Circle) near Monchego Park. The ranch has four cabins available for rent and provides hunting, fishing, and horseback riding trips.

**Roads and Travel Management**

Roads were constructed in the Cochetopa Hills project area under previous projects and general public use. Historically, there has been approximately 209 miles of NFS roads in the planning area and approximately 48 miles of non-system roads open to public use (this has changed with the recent adoption of the Gunnison Travel Management Plan). Travel off of established routes has been restricted to foot or horseback since 1991.

**Timber Harvest and other Vegetation Management**

Vegetative treatments have occurred over the past few decades on national forest land within the Cochetopa Hills boundary using timber sales and burning projects. Table 11 displays the acreage and percent of area for all known vegetation management related ground disturbing activities within the major watersheds (94,041 acres) of the planning area since 1950.



Table 11. Historic Vegetation Management Activities within the Cochetopa Hills Analysis Area (1950 to 2011)

Activity	decade of activity						Total
	1950s	1960s	1970s	1980s	1990s	2000s	
Disease Control	-	-	-	-	53 (0%)	-	<b>53 (0%)</b>
Fuel Break	-	52 (0%)	-	-	-	-	<b>52 (0%)</b>
Fuel Rearrangement (compacting, pruning, piling)	-	-	-	-	6 (0%)	-	<b>6 (0%)</b>
Partial Cut (thinning, shelterwood, & seed tree)	4,072 (4%)	1,730 (2%)	2,835 (3%)	1,828 (2%)	1,483 (2%)	284 (0%)	<b>12,232 (13%)</b>
Precommercial Thin	-	910 (1%)	13 (0%)	1,967 (2%)	1,265 (1%)	-	<b>4,155 (4%)</b>
Prescribed Burning (broadcast & under burn)	-	-	-	1,713 (2%)	6,428 (7%)	667 (1%)	<b>8,808 (9%)</b>
Regeneration Cut (clear cut, shelterwood, seed tree, coppice)	48 (0%)	545 (1%)	328 (0%)	547 (1%)	393 (0%)	-	<b>1,861 (2%)</b>
Soil Scarification (site prep.)	-	70 (0%)	-	132 (0%)	483 (1%)	-	<b>685 (1%)</b>
Wildfire Caused Fire Damage	-	26 (0%)	-	-	24 (0%)	-	<b>50 (0%)</b>
Wildland Fire Use	-	-	-	-	-	52 (0%)	<b>52 (0%)</b>
Wildlife Habitat Create Openings	-	-	-	75 (0%)	-	-	<b>75 (0%)</b>
<b>Total</b>	<b>4,120 (4%)</b>	<b>3,333 (4%)</b>	<b>3,176 (3%)</b>	<b>6,262 (7%)</b>	<b>10,135 (11%)</b>	<b>1,003 (1%)</b>	<b>28,029 (30%)</b>

\* the value in brackets is the percentage of total watershed area (94,041 acres) including private land.

It is important to note that many of the activities reported in Table 11 were applied to the same “acre of land” and the value would be interpreted incorrectly if this is not considered. To put this in perspective, since 1950 the total number of acres within the watersheds of the planning area that have had at least one ground disturbing activity is 18,786 acres, or 20% of the total land area. It is also important to note that this report does not include the activities that have occurred on the private land which tend to impact the non-forested valley bottoms and riparian areas. Activities on private land have mainly related to ranching and agricultural operations such as construction of houses and barns, roads, fences, irrigation structures and pasture utilization by livestock.

### 3.3.2. Ongoing Activities

Ongoing activities are those activities that are currently occurring within the project area. Many of the activities mentioned above continue today. These include cattle grazing, treatment for noxious weeds near Highway 114, private land ownership, and recreation. Use of NFS roads will change under the adoption of the Gunnison Travel Management Plan. Timber management will depend upon which management alternative in this EA is adopted, if any.

#### **Grazing**

Cattle grazing continues in open parks and meadows within the Cochetopa Hills planning area. Six grazing allotments fall within the planning area: Archuleta, Dome, Monchego, Myers, Razor, and Rock. The grazing season is generally mid-June to late September/early October. Details of allotments, number of acres, number of cattle, etc. can be found in Table 23, Range Resources.

Domestic livestock grazing generally occurs in open areas with low tree cover where forage plants are most abundant. Transitory range, which can convert to forest vegetation over relatively short timespans of 10 to 20 years, can have high tree cover and little forage in the understory. Besides foraging, livestock also utilize areas with high tree cover for shade and relief from insects, and may trail through transitory range as they move between primary use areas.

#### **Noxious Weeds**

The Decision Notice on Noxious Weeds on the Gunnison Ranger District, Colorado currently allows the use of herbicides, mainly along roads and other areas of soil disturbance related to management activities. Limitations on herbicide use are listed above under Past Activities.

#### **Private Land In and Around the Project Area**

As noted above, development is mostly ranching based with very low densities of houses and other structures. Land and water developments, limited timber harvest, and other activities may occur on private parcels. Site-specific data is not available for these activities.

#### **Recreation**

Recreational activities (hunting, fishing, hiking, biking, ATV/motorcycle riding, wood cutting and camping) continue to occur in the Cochetopa Hills project area, including hiking on the CDNST. In the winter, there is a moderate amount of snowmobiling, snowshoeing and back country skiing. A variety of outfitter and guide services operate within the planning area, including a guest ranch (The Quarter Circle).

#### **Roads and Travel Management**

Effective on July 1, 2010, the Gunnison Travel Management Plan reduces the miles of roads on NFS lands within the Gunnison Ranger District. The purpose is to create a more sustainable travel system while maintaining visitor and management access, in accordance with regulations 36 CFR Parts 212, 251, 261, and 295, and as described in *Travel Management: Designated Routes and Areas for Motor Vehicle Use; Final Rule*. The plan closes about 550 miles of road within the Gunnison National Forest, but has little impact on the Cochetopa Hills project area. Travel off of established routes continues to be restricted to foot or horseback throughout the project area.

As shown in Table 11, vegetation management has been limited to prescribed burning (667 acres in the past decade), and wildfire (52 acres in 2007) in the past decade. Prescribed burning has mainly occurred in the shrub and grass vegetation types. A partial cut treatment of 284 acres has also occurred. Management activities of the past decade affect only 1% of the planning area. No timber harvesting is currently taking place within the planning area.

### *3.3.3. Foreseeable Future Activities*

Foreseeable future activities are those activities that are continuing or are expected to occur within the next ten years or beyond. Foreseeable activities include continued livestock grazing on NFS lands and ranching activities on neighboring private land. Noxious weeds will continue to be treated along roadways. Road management and maintenance will continue in accordance with the Gunnison Travel Management Plan. If the population in Colorado continues to grow, recreational activities on the GMUG may increase. Future timber harvest and vegetation management activities will depend on which alternative is adopted, and the amount of salvage harvesting that may occur.

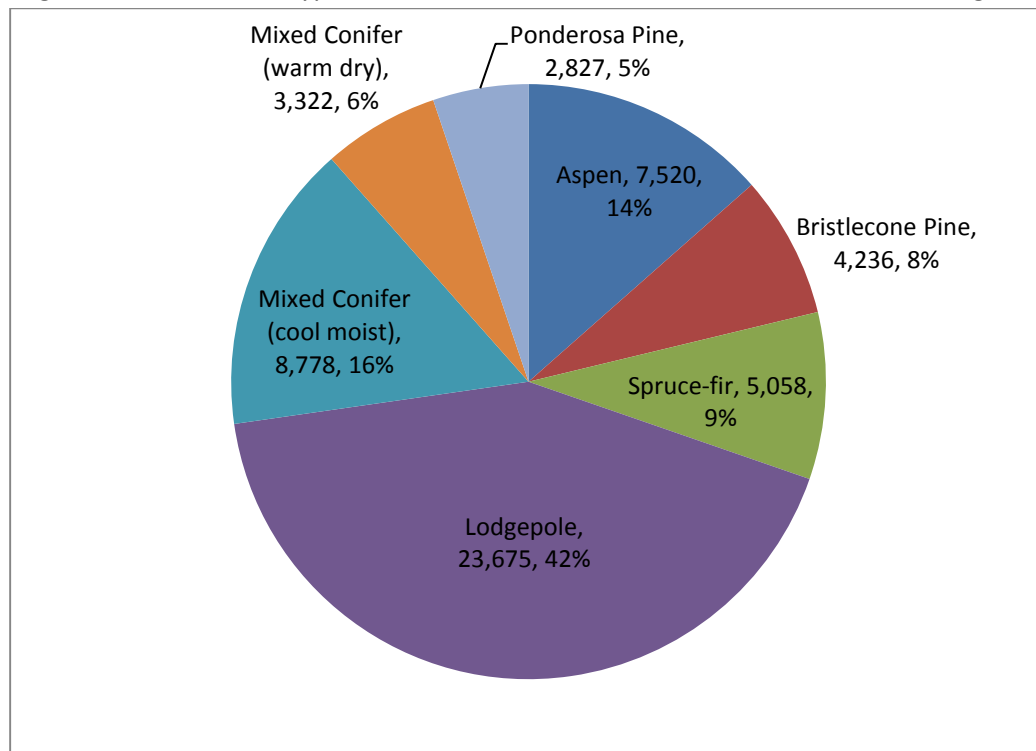
Since the inception of this project, a large scale spruce bark beetle epidemic has developed within the spruce/fir and spruce/fir-aspen cover types, and has caused significant mortality of mature spruce trees across the landscape. To respond to the event the GMUG National Forests are currently planning wide spread spruce salvage harvesting within the Cochetopa Hill Landscape, and other portions of the GMUG NFs. At this time it is not known which stands will have salvage harvesting, or at what scale they would occur at. The forest wide spruce salvage Environmental Impact Statement will consider the Cochetopa Hills project activities in the cumulative impacts analysis when considering new spruce salvage treatments.

## **3.4. Forest Resources**

### *3.4.1. Existing Conditions – Forest Resources*

Within the planning area there are seven major forested cover types (Figure 3 and 4), and a large component of open parks and meadows (sagebrush, potentilla, grass/forbs, riparian). The lodgepole pine cover type makes up the majority of the forested area (42%) within the planning unit, and is located mainly in the Razor Creek watershed at the north end of the project area (FSVeg, 2011). The next most prevalent cover type is the cool moist mixed conifer type (16%). The remaining forest cover types include aspen (14%), spruce-fir (9%)\*, bristlecone pine (8%), warm dry mixed conifer (6%), ponderosa pine (5%) - listed in order of predominance within the landscape.

Figure 3. Forest Cover Types on the Gunnison National Forest within the Planning Area.



\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012

Figure 4. Map of Vegetative Cover Types within the Cochetopa Hills Landscape.

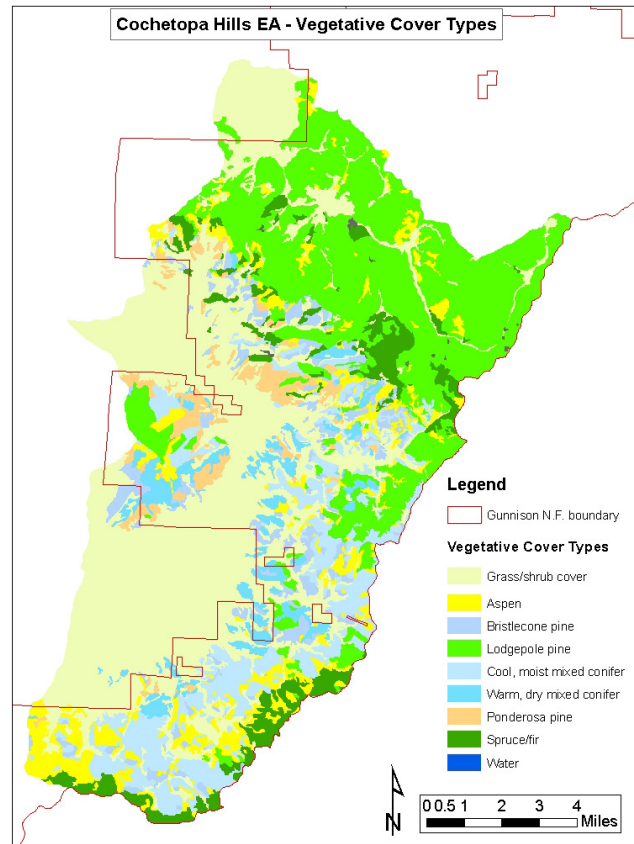


Table 12 displays the Habitat Structural Stage (HSS) of the cover types within the Cochetopa Hills planning area on national forest land (FSVeg, 2011). The HSS is a vegetation classification system used by the U.S. Forest Service to represent stand structure at a coarse level that is useful for broad, landscape level analysis of forest condition and wildlife habitat quality. This classification system has three components: vegetative species, canopy cover density and average stand diameter. Vegetation species (timber, shrub or grass) is identified by the major cover type, and is represented by a three-to-five character letter code.

The **density component of the HSS system** is based on canopy cover, and is defined as follows:

- A** = 10% - 40% canopy cover (less than 10% cover is a 2T or 2S, *see below*)
- B** = 40% - 70% canopy cover
- C** = greater than 70% canopy cover

The **size component of the HSS system** is based on average stand diameter, and is defined as follows:

- 1** = non-tree cover (grass or small shrubs)
- 2** = less than 1 inch average DBH or shrub type (2T = *timber type*, 2S = *shrub type*)
- 3** = average DBH between 1 and 9 inches

**4** = average DBH greater than 9 inches

**5** = old growth structural stage (determined by a GMUG Forest based “scorecard” process)

As Table 12 illustrates, the general condition of all the forested cover types within the planning area is mature and of advanced age with a medium density (40% to 70% canopy cover) HSS class B. The advanced age of most of these stands is depicted by the large amount of HSS size class 3 and 4 within the landscape (52,137 acres, 95%). The size class component of the HSS classification can be used as a surrogate for age (i.e. larger average stand diameters are correlated to older age).

Table 12. Land Cover and Habitat Structural Stage, National Forest Lands – Cochetopa Hills Planning Area (acres)

Habitat Structural Stage	Aspen	Bristlecone Pine	Spruce-fir*	Lodgepole	Mixed Conifer (cool moist)	Mixed Conifer (warm dry)	Ponderosa Pine	Total Forested	Riparian	Rock	Shrub	Grass	Water	Total
										99			1	100
<b>1</b>									841			14,358		15,199
<b>2S</b> shrub									876		137	1,705		2,718
<b>2T</b> timber			32	83	3			119						119
<b>3A</b>	381	808	174	566	425	161	300	2,814	91					2,906
<b>3B</b>	4,248	755	1,214	3,735	1,991	1,145	292	13,380	126					13,506
<b>3C</b>	584			8,786	224			9,594	22					9,616
<b>Total size 3</b>	<b>5,213</b>	<b>1,563</b>	<b>1,388</b>	<b>13,086</b>	<b>2,640</b>	<b>1,306</b>	<b>593</b>	<b>25,788</b>	<b>239</b>					<b>26,027</b>
<b>4A</b>	323	1,388	119	200	152	417	1,242	3,842	62					3,904
<b>4B</b>	1,328	1,209	1,971	2,579	3,678	1,191	971	12,926	59					12,985
<b>4C</b>	481		542	6,944	1,323	291		9,581	168					9,749
<b>Total size 4</b>	<b>2,132</b>	<b>2,597</b>	<b>2,632</b>	<b>9,723</b>	<b>5,153</b>	<b>1,899</b>	<b>2,213</b>	<b>26,349</b>	<b>289</b>					<b>26,638</b>
<b>5 - OG</b>	175	76	1,006	782	983	118	21	3,160						3,160
<b>Total</b>	<b>7,520</b>	<b>4,236</b>	<b>5,058</b>	<b>23,675</b>	<b>8,778</b>	<b>3,322</b>	<b>2,827</b>	<b>55,416</b>	<b>2,244</b>	<b>99</b>	<b>137</b>	<b>16,063</b>	<b>1</b>	<b>73,960</b>

\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012

Based on HSS data, only 119 acres are within the HSS size class 2, seedlings and small sapling stage (Table 12 & Figure 5). Of the remaining forested area, 25,788 acres are in size class 3 (1 - 9 inch DBH), 26,349 acres are within size class 4 (> 9 inch DBH), and 3,160 acres are classified as having an old growth

structural stage. It is important to note that some of the HSS size 3 stands are young, sapling stands, but the majority of them are older, mature (> 100 years of age) stands. This is due to the low site productivity within the planning area, and the fact that it takes a long time for a tree to grow to a DBH larger than 9 inches within certain stands. Based on field data measured in 2009, it is estimated that 80% to 90% of the stands within the planning area are over 150 years of age, and many are over 200 years of age. Table 13 lists the average tree age and average maximum tree age per stand for sampled tree data that was collected within the planning area, reported by tree species.

Figure 5. Habitat Structural Stage (HSS) Size of Forested Cover Types within the Planning Area (Gunnison National Forest lands).

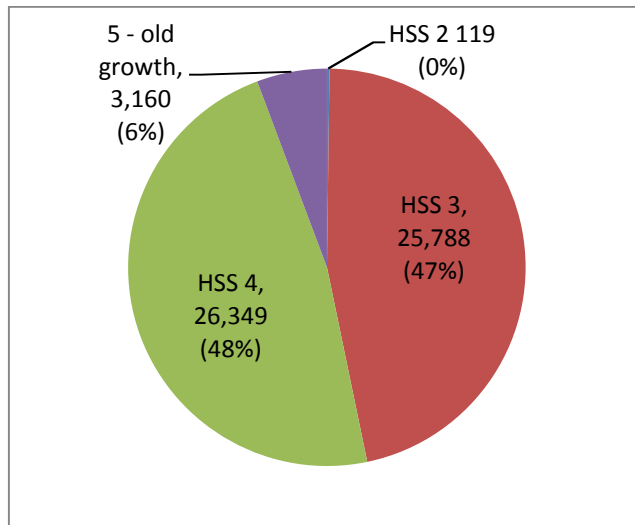


Table 13. Summary of Measured Overstory (>6" DBH) Tree Ages by Species within the Cochetopa Hills Planning Area

	Subalpine fir	Bristlecone Pine	Lodgepole pine	Engelmann Spruce	Limber Pine	Ponderosa pine	Blue Spruce	Aspen	Douglas-fir
Average tree age per stand	140	201	183	174	309	152	126	105	191
Average maximum tree age per stand	180	247	264	256	309	171	170	120	304

### Bark Beetle Risk

Due to the older condition of many of the stands within the planning area there is a considerable risk of bark beetle infestation. Table 14 lists the bark beetle risk ratings by forest cover type of the Gunnison

National Forest lands within the planning area (USDA Forest Service, GMUG NF Forest Plan revision, 2007). Every conifer cover type has a large proportion of area in the high and moderate risk category. Overall, 62% of the area across all cover types is classified with a high risk rating, and 36% is classified with a moderate risk (98% as high or moderate).

Table 14. Bark Beetle Risk Rating by Forest Cover Type – Cochetopa Hills Planning Area

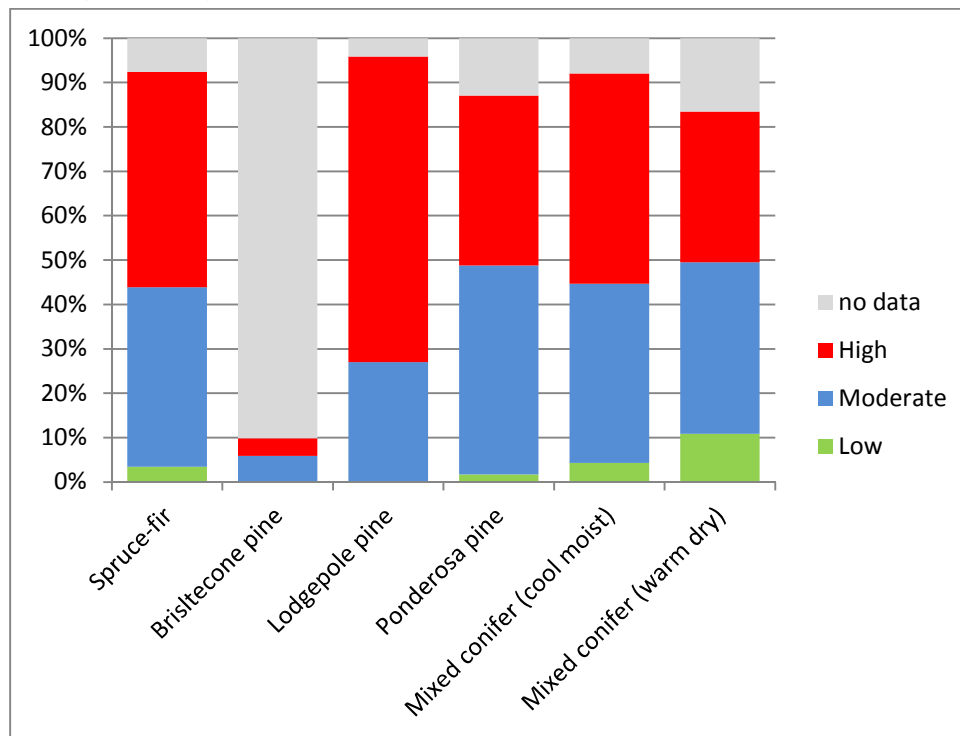
Forest Cover Type	bark beetle risk rating*			no data	total
	High	Moderate	Low		
Spruce-fir**	2,450	2,048	176	385	5,058
Bristlecone pine	172	253	2	3,808	4,236
Lodgepole pine	16,305	6,348	48	973	23,674
Ponderosa pine	1,078	1,324	49	375	2,826
Mixed conifer (cool moist)	4,166	3,536	379	698	8,778
Mixed conifer (warm dry)	1,109	1,264	372	582	3,326
Total	25,279 (62%)	14,773 (36%)	1,025 (2%)	6,821	47,898

\* Beetle risk ratings are based on models for Douglas-fir beetle, mountain pine beetle, and spruce beetle using the methods described in Hessberg et.al. 1999, and are derived from the Forest Plan Revision analysis and mapping (USDA Forest Service, 2007). Mixed conifer stands were classified using the model of the dominant species within the stand.

\*\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012



Figure 6. Bark Beetle Risk Rating as a Percentage within each Forested Cover Type within the Planning Area (NFS lands).



As Table 14 and Figure 6 illustrate, a large portion of the conifer forest within the landscape has a moderate to high bark beetle risk rating - 62% high risk, 36% moderate risk, and 98% combined. It is important to note that the risk rating for the mixed conifer cover types is likely overstated due to the fact that the risk models were developed for Douglas-fir, pine and spruce beetle in their major habitat types (Douglas-fir, lodgepole pine, ponderosa pine and spruce-fir), and the species diversity present in the mixed conifer forest type adds a higher level of resiliency that is not present in the more homogeneous forest types. For analysis and comparison purposes, the beetle risk model of the dominate species of each mixed conifer type was used to assign a risk value. This rating is more or less accurate depending on the proportion of the evaluation stand that is composed of the bark beetle host tree species the model is based on.

If the mixed conifer cover types are eliminated from this analysis, 99% of the remaining conifer cover types within the landscape (Douglas-fir, lodgepole pine, ponderosa pine, bristlecone pine and spruce-fir) have a beetle risk rating of moderate or high – 66% high and 33% moderate.

#### **Current Condition versus Historic Range of Variability -*Potential Natural Vegetation (PNV) and Ecological Succession***

To assess the condition of forest habitat in the landscape as compared to what is expected to exist under a functioning natural disturbance regime, a comparison was made of existing verses expected

levels of successional stages within the Cochetopa Hills landscape. Existing successional stages of the “climax” (PNV) forest types within the analysis area were compared to expected landscape levels under a functioning natural disturbance regime (i.e. no fire suppression). The mixture of forest successional stages that should occur naturally within the Gunnison Basin was determined through VDDT modeling (Comprehensive Evaluation Report, 2007). Not all forest cover types were modeled in the 2007 Comprehensive Evaluation Report, so only the aspen, lodgepole pine and spruce-fir types are available for this analysis. Table 15 reports the results of the comparison.

Table 15. Landscape Proportion of Current Seral Stage Reported by PNV\* Groupings for the Major Forest Cover Types

Seral Stage	Aspen		Lodgepole pine		Spruce/fir*	
	Current Landscape Proportion	Target Proportion (VDDT Model)	Current Landscape Proportion	Target Proportion (VDDT Model)	Current Landscape Proportion	Target Proportion (VDDT Model)
early seral	3%	8 to 25%	3%	8 to 14%	2%	27 to 32%
mid seral	24%	23 to 38%	19%	23 to 38%	10%	20 to 30%
late seral	72%	23 to 55%	78%	40 to 55%	88%	31 to 53%

\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012

As Table 15 demonstrates, the aspen, lodgepole pine and spruce/fir forest types are under-represented in the early seral successional stage, and are overabundant in the late seral successional stage at the time the data was compiled. The Douglas-fir and mixed conifer cover types are also over represented in the mid and late seral stages, but these forest types have not been modeled for the GMUG NFs, therefore a quantified comparison cannot be made.

The major disturbance process of the forest types in the Cochetopa Hills landscape have historically been driven by wildfire, and in more recent times, timber harvesting. Suppression of fire over the past century has created the imbalance within the landscape. This situation is not consistent with the Southern Rockies Lynx Amendment, Objective Veg. O1; stated as: “manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx” (Chapter 1, section 1.7.1). In addition, this type of imbalance indicates a lack of age class diversity within the landscape that create stand conditions that are more susceptible to large scale insect and disease epidemics and wildfire events.

#### Stand Conditions and Opportunities by Forest Cover Type

Resource risks and opportunities exist within each of the major vegetative cover types within the planning area. Treatment options can be identified by comparing the desired condition to the existing

condition within the landscape. In the next section, each cover type within the Cochetopa Hills planning area is discussed in the context of its existing condition, risks and potential treatment opportunities.

***Spruce-fir and Spruce-fir/aspen (5,058 acres, 9% of the forested area)***

The spruce-fir and spruce-fir/aspen cover type within the Cochetopa Hills planning area represents the most productive sites in the higher elevations. Most of this area has had timber harvesting operations in the past, and contains a modern road system designed to the standards required for the transport of wood products. A recent spruce bark beetle epidemic within the spruce-fir and spruce-fir/aspen cover type has occurred within the Cochetopa Hill planning area which has dramatically altered the state of these communities. Mortality rates of mature spruce trees are in excess of 95% in most stands, and the epidemic is spreading extensively across the landscape, and all stands have been affected by it. Short term opportunities exist to continue to provide wood products in an efficient and cost effective manner within the spruce-fir cover type, through salvage harvesting – although these activities would be proposed and analyzed in a separate NEPA process.

***Lodgepole pine (23,675 acres, 42% of the forested area)***

The lodgepole pine cover type within the Cochetopa Hills planning area is located mainly in the northern portion of the planning area at mid to high elevations (Figure 4). Like the spruce-fir type, most of this area has had timber harvesting operations in the past, and contains a modern road system designed to the standards required for the transport of wood products. Opportunities exist to continue to provide wood products in an efficient and cost effective manner within the lodgepole pine cover type. Continuing to create age class diversity within the lodgepole pine stands is a critical need to provide protection from insect and disease infestations. Regeneration treatments will improve winter snowshoe hare habitat by creating dense horizontal cover (early seral stage) and providing favorable growing conditions. Trees growing in this open environment will have full crowns, extending to the ground.

There are opportunities to thin young lodgepole pine stands to increase tree growth and provide post and pole material – where stands are healthy. In older, “dog hair” thickets of lodgepole pine, clearcutting can be used to regenerate the stand. The new cohort of seedlings will provide a shifting diversity of habitats through time as the stand develops. These newly regenerated stands can be managed to grow into large mature stand structures. This mature, large tree habitat would be unattainable from the dense, suppressed condition of a “dog hair” stand. Similarly, there are opportunities within the Cochetopa Hills landscape to regenerate lodgepole pine stands that are infected with dwarf mistletoe and capture the full productivity of the site.

Lodgepole pine in the southwestern portion of the Cochetopa Hills planning area is at the southern boundary of its’ natural range. In this portion of the planning area, there is an opportunity to maintain species diversity by promoting the retention of lodgepole in the stands where they exist.

***Aspen (7,520 acres, 14% of the forested area)***

As is the case for most of the Gunnison Ranger District, the aspen stands in the Cochetopa Hills planning area are mature and nearing the end of the physiological life span of this short lived species.

Compounding this situation is the heavy browse pressure and the consequent damage to aspen sprouts which significantly reduce the successful establishment of a new aspen stand. Furthermore, Sudden Aspen Decline (Worrall, et.al., 2008) is impacting aspen stands within the planning area.

A significant need and opportunity exists to regenerate aspen stands within the planning area.

Silvicultural treatments can be applied to these aspen stands to stimulate a robust sprouting response (coppice). Silvicultural techniques can be applied to help minimize the impact of browsing pressure on aspen sprouts and increase the success rate of new stand establishment.

***Mixed Conifer - warm dry (3,322 acres, 6% of the forested area)***

The dry type mixed conifer stands in the Cochetopa Hills planning area are composed of large, old residual ponderosa pine and/or Douglas-fir with a dense, younger component of blue spruce, Engelmann spruce, subalpine fir and aspen, and in some cases limber pine or bristlecone pine. This forest type has historically experienced a more frequent, low severity fire disturbance interval. With the effects of fire suppression over the past 80 to 100 years, the stand densities have become considerably higher and are now subject to high severity, stand replacing fires, and species composition is shifting to the more shade tolerant and fire intolerant species (spruce and fir). Opportunities exist to apply silvicultural treatments in the dry mixed conifer stands to reduce stand densities, retain the large, old residual ponderosa pine and Douglas-fir, and promote the regeneration and growth of these species. These treatments would increase stand resistance to insect and disease infestation, and reduce the risk of high severity fires.

***Mixed Conifer – cool moist (8,778 acres, 16% of the forested area)***

The cool-moist mixed conifer forest type is much like the dry mixed conifer forest, except the large, old residual ponderosa pine and Douglas-fir component is not present to the same degree. The cool-moist mixed conifer forest type historically has experienced a longer, mixed severity, mosaic producing fire disturbance regime. A mixed-severity fire regime includes some areas of slow-moving surface fire that consumes duff and litter and kill some low-lying vegetation, while in other areas, mid-canopy fuels ignite and carry fire to the main canopy for short runs, killing groups of overstory trees. The result is the creation of stands diverse in terms of horizontal and vertical structure, species composition, and spatial distribution of vegetation. Within the mosaic of stand conditions existing in the cool-moist mixed conifer type of the Cochetopa Hills planning area, the aspen component is the most vulnerable to decline. Aspen is a shade intolerant species and cannot compete over time with the more shade tolerant conifers (spruce and fir). Without disturbance, the aspen component will decline and conifer will dominate, or completely take over the stand area. Opportunities exist to use silvicultural treatments in the cool-moist mixed conifer stands to create and enhance regeneration of aspen clones, and to perpetuate the mosaic pattern of diverse conditions that existed historically in these forest types (i.e. vertical and horizontal structure).

***Ponderosa pine (2,827 acres, 5% of the forested area)***

Stands of ponderosa pine exist in the lower elevations of the Cochetopa Hills planning area. The ponderosa pine cover type in the Cochetopa Hills area has historically experienced a low severity, frequent fire disturbance regime. These stands have become dramatically denser with the establishment and growth of shade tolerant and fire intolerant species - mainly blue spruce and young Douglas-fir under the pine overstory. Fortunately, many of the stands within the landscape have been previously thinned, and are currently within historical conditions. Some opportunity exists to use silvicultural treatments to thin the remaining untreated stands within the Cochetopa Hills planning area. Opportunities also exist to utilize prescribed fire to maintain the existing stand conditions on sites that have been previously treated. The ponderosa pine cover type is moderately rare within the Cochetopa Hills area and on the Gunnison Ranger District. Maintaining the ponderosa forest type is an important goal for species and habitat diversity. A portion of the ponderosa pine cover type is located on Cochetopa Dome within the planning area. These stands are in the Cochetopa Dome Inventoried Roadless Area and are not proposed for treatment at this time.

***Bristlecone pine (4,236 acres, 8% of the forested area)***

Bristlecone pine forest types exist within the Cochetopa Hills planning area on low quality sites that generally will not support other conifer species. The bristlecone pine type has very little commercial value, however it contributes to habitat diversity within the landscape, and is an important component to maintain. The bristlecone pine stands in the Cochetopa Hills area have a higher density than historic conditions indicate, yet these stands remain relatively healthy.

White pine blister rust (WPBR) is an exotic, invasive fungus that will infect and kill bristlecone pine trees. This pathogen has not been found within the Cochetopa Hills planning area, but is present in Colorado, and is expected to spread to the Cochetopa Hills area in the future (Howell, et.al. 2006; Schoettle, A.W. 2004 ). WPBR is very damaging to five needle pine stands, and will likely have a dramatic impact to the bristlecone pine cover type. In addition to WPBR, bristlecone pine stands are also vulnerable to mountain pine beetle attack – particularly in the denser conditions in which they exist today in the Cochetopa Hills planning area. Opportunities exist to utilize silvicultural treatments to proactively reduce the impact of WPBR and mountain pine beetle on the bristlecone pine forest type within the Cochetopa Hills planning area. Thinning and regeneration of a younger cohort within bristlecone stands will minimize the impact of mountain pine beetle and WPBR (Coop and Schoettle, 2008). Furthermore, an opportunity exists to test the genetic resistance to WPBR of local bristlecone and limber pine trees, and build a seed bank to be available for future plantings.

***Open Parks and Meadows (16,063 acres, 22% of the planning area excluding private)***

Fire exclusion within the Cochetopa Hills planning area has allowed the encroachment of trees into open parks and meadows. Furthermore, ecological succession has also created an abundance of mature brush and reduced the forage production on these lands. Prescribed fire and mechanical treatments can be used to reduce or interrupt conifer encroachment into rangelands, and return the forage composition to earlier seral stages. Increases in forage production will benefit domestic livestock and certain wildlife species.

### *3.4.2. Direct and Indirect Effects, Forest Resources – No Action and Alternatives 1 and 2*

Within the action alternatives, direct effects to the forest resource include the immediate physical impact to the treatment stands caused by the action of logging, and burning. This impact will cause some damage to the residual trees and other vegetation within the treatment areas. However, this level of damage is not expected to be significant at the overall stand and landscape scale. Given the overabundance of mature, shaded environments within the forest types of the analysis area, this impact is expected to have a net positive effect.

#### **Indirect Effects Related to the Action Alternatives**

The main effects of the silvicultural treatments applied to the forested stands within the planning area under Alternatives 1 and 2 are designed to accomplish the Forest Plans goals and objectives as outlined in Chapter 1 of this document. Each action alternative will meet these goals to varying degrees. Overall, the effect of the treatment alternatives will increase age class and species diversity by creating canopy openings, and will create environmental conditions that stimulate the reproduction of tree species and other open grown grasses and forbs.

Negative effects will also occur during the implementation of either action alternative - as well as the no action alternative. For the action alternatives, detrimental impacts are mainly related to logging damage to individual trees and vegetation, and the reduction of habitat for some species of wildlife - as trees are killed or removed. Impacts to wildlife habitat, as well as soil and watershed resources are addressed in other sections of this chapter.

The no action alternative has negative impacts related to the continued loss of species and age class diversity, the continued high risk of wild fire, insect/disease attacks, loss of potential site productivity, and the lost opportunity to utilize wood products from the treatment areas.

Within the context of the goals of this project and the key issues that were identified, there are four main indicators of the treatment affect to the forest resource that are useful to evaluate. These indicators are: changes to HSS; changes in bark beetle risk; proportion of seral stage within the landscape (pre and post treatment); and acres of regenerated stands (pre and post treatment). Each of these indicators will be discussed in relation to all of the alternatives proposed in this analysis (including no action).

#### **Effects to Habitat Structural Stage**

Natural or human caused disturbance alter forest conditions and influence HSS classifications. The alteration generally comes from the reduction of canopy closure and the removal (or mortality) of the larger diameter trees. This modification of the forest growing environment will have negative impacts to some shade tolerant species, and positive effects to pioneer species, grasses and most forbs. After disturbance, stands recover through regeneration of trees, tree growth, and crown spread filling in gaps. Time to recover to the pre-disturbance classification depends on site quality, the type of disturbance

and how intense that disturbance was. Table 16 below provides a generalized schedule for structural stage change, with recovery after the harvest and prescribed burning disturbances being considered in this analysis. For individual stands, there are a number of factors which may change the recovery rate.

Table 16. Predicted Change in Forest Structural Stage after Treatment Disturbance

Type of Disturbance	Pre-disturbance Structural Stage	Post-disturbance Structural Stage	Recovery Stage and Time
Group Selection and Selection (including fuel break)	5	4B	5 in 20 years
	4C	4B	4C or 5 in 20 years
	4B	4B	4C or 5 in 30 years
	4B	4A	4B in 20 years 4C in 60 years 5 in 100 years
Aspen Burn, Aspen Coppice	4C, 4B, 4A, 3C, 3B, 3A	2T	3C in 30 years 4C in 70 years
Bristlecone Pine thinning	4C, 4B	4B	4C in 30 years
Clearcut, Mistletoe control & Patch cut (fuel break and strips) -lodgepole pine	4C, 4B, 4A, 3C, 3B, 3A	2T	3B in 40 years 4C in 80 years
Pole thinning	3B or 3C	3A	4B in 20 years 4C in 35 years
Poles – clearcut	3B or 3C	2T	3C in 30 years 4C in 70 years
Poles – thin/aspen	3B or 3C	3A	3C 20 years 4B 30 years
Overstory Removal	4B	3A	3B in 20 years 4B in 40 years 4C or 5 in 100 years
PP/DF Restoration	5, 4C, 4B, 4A	4A	4A (maintained with frequent surface fire)
Shelterwood Seed Step (DF & LP)	5, 4C, 4B, 4A	4A	3A in 40 years (after OR) 3B in 60 years 4B in 100 years
Mixed conifer management burn	5, 4C, 4B	4A	4B in 20 years 4C in 40 years
Maintenance burn Douglas-fir and ponderosa pine	4A	4A	4B in 30 years 4C in 50 years
	4A	4A	4A (maintained with frequent surface fire)

Based on the relationship identified in Table 16, the expected changes in HSS for each action alternative were calculated. These results are displayed in Table 17. The largest shift in HSS is expected to occur in size/density class 4A with an increase of over 2,000 acres (Alt1 = 2,908 acres & Alt 2 = 2,805 acres). This shift represents a 5% increase within the forested portions of the planning area, and is created mainly from stands with a 4C or 4B condition prior to treatment. Similarly, the 3A category is expected to increase from 2% to 3% under both action alternatives (Alt 1 = 1,138 acres & Alt 2 = 1,841 acres). These stand changes in the size class 3 and 4 HSS types are created by the partial cutting (Group Selection, Selection, and Ponderosa Pine/Douglas-fir Restoration) and mixed conifer management burn treatments, and reflect the more open stand conditions that will be created.

Table 17. Existing and Post Treatment Forest Habitat Structural Stage (all alternatives)\*

Habitat Structural Stage (HSS)	Existing Condition - no action (acres)	Landscape Percent	Alt 1 - Post Treatment (acres)	Alt 1 - Landscape Percent	Alt 2 - Post Treatment (acres)	Alt 2- Landscape Percent
2T	105	0.2%	740	1.3%	595	1.1%
3A	3,038	5.4%	4,176	7.4%	4,879	8.7%
3B	13,506	24.1%	12,454	22.2%	12,120	21.6%
3C	9,616	17.2%	9,438	16.8%	9,438	16.8%
4A	3,904	7.0%	6,812	12.2%	6,709	12.0%
4B	12,990	23.2%	11,505	20.5%	11,266	20.1%
4C	9,749	17.4%	8,411	15.0%	8,411	15.0%
5	3,160	5.6%	2,530	4.5%	2,530	4.5%

\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012

The more open stand conditions of the HSS 4A and 3A structure will stimulate vegetative establishment of trees, shrub, grass and forb species, by creating a favorable, more open growing condition for shade intolerant species. Tree regeneration is determined from the surrounding seed source (or aspen roots), and will favor pioneer species such as aspen, lodgepole pine, and Douglas-fir (somewhat) when they are present. Within the spruce-fir forest type that is mixed with aspen and lodgepole pine, these pioneer species will capture the site in higher proportions than sub-alpine fir and spruce. In stands of pure spruce-fir that survive the current bark beetle epidemic, Engelmann spruce and blue spruce regeneration will be favored over sub-alpine fir, as these species are slightly less shade tolerant. The increased tree regeneration and establishment resulting from these partial cutting and burning treatments will increase age class and species diversity within the treatment stands. The establishment of the pioneer species is of particular benefit due to the historic lack of disturbance and the ongoing decline of these species due to ecological succession.

Over time, the canopy will fill in and the trees regeneration will grow to a larger size class and contribute to higher size and density characteristics of HSS. Table 16 displays the expected recovery times for the



initial stages of treatment response for each prescription. As regeneration grows, vertical diversity will increase and stand structures will trend toward a more complex, multilayered condition that will provide valuable habitat for certain wildlife species. Additionally, this increased vertical diversity and the resulting multi-layered stand structure will more closely mimic late seral and old growth habitat characteristics.

The creation of HSS class 2T represents stand replacing regeneration, and is discussed in the “Effects to Forest Regeneration” section below.

### Effects to Bark Beetle Risk

Table 18 provides a summary of the expected effects to bark beetle risk rating, combined for all forest types and bark beetle species. The effects to bark beetle risk from each of the action alternatives are almost identical, with only a 1% difference between each category. Both Alternative 1 and Alternative 2 reduce the risk of bark beetle infestation within the landscape.

Implementation of Alternative 1 would change 2,345 acres from the high risk category into a moderate or low classification. The area of low bark beetle risk would almost double by an increase of 1,001 acres. Implementation of Alternative 2 would be very similar to Alternative 1 with a decrease of 2,613 acres from the high risk category, and a 782 acre increase in low risk stand conditions.

Table 18. Acres of Pre and Post Treatment Bark Beetle Risk Rating (all alternatives)

Bark Beetle Risk Rating	Existing Condition	% of Area	Post Treatment Bark Beetle* Risk Rating			
			Alternative 1	% of Area	Alternative 2	% of Area
High	25,279	62%	22,934	56%	22,666	55%
Moderate	14,773	36%	16,118	39%	16,604	40%
Low	1,025	2%	2,026	5%	1,807	4%
no data	6,821		6,821		6,821	

\* For ease of comparison, all bark beetle species and forest cover types were combined within this table. The appropriate bark beetle species and risk model was used for each forest cover type and compiled to derive this summary (USDA Forest Service, 2007).

The effect to bark beetle risk ratings by forest cover type and corresponding beetle species are listed in Table 19 below. The largest reduction in bark beetle risk is projected to occur from Alternative 1 in the logepole pine cover type, with a 595 acre increase in area of low risk rating for mountain pine beetle. Alternative 2 is expected to create an additional 471 acres of low risk rating for mountain pine beetle within the logepole pine cover type.

Other substantial reductions in bark beetle risk are expected to occur from Alternative 1 and Alternative 2 within the cool moist mixed conifer and the warm dry mixed conifer cover types. These reductions are

mainly from the high to moderate category – due to the partial cutting nature of the treatments applied to these stands.

Table 19. Acres of Pre and Post Treatment Bark Beetle Risk Rating by Forest Type (all alternatives)

Acres of Post Treatment Bark Beetle Risk Rating						
Bark Beetle Risk Rating	Existing Condition (pre treatment)	% of Classified Area	Alternative 1	% of Classified Area	Alternative 2	% of Classified Area
five needle pine						
High	172	40%	161	38%	161	38%
Moderate	253	59%	263	61%	263	61%
Low	2	1%	4	1%	4	1%
lodgepole pine						
High	16,305	72%	15,205	67%	15,247	67%
Moderate	6,348	28%	6,853	30%	6,934	31%
Low	48	0%	643	3%	519	2%
mixed conifer - cool moist						
High	4,166	52%	3,459	43%	3,459	43%
Moderate	3,536	44%	4,103	51%	4,109	51%
Low	379	5%	519	6%	512	6%
mixed conifer - warm dry						
High	1,109	40%	880	32%	889	32%
Moderate	1,264	46%	1,296	47%	1,367	50%
Low	372	14%	567	21%	488	18%
ponderosa pine						
High	1,078	44%	1,073	44%	1,074	44%
Moderate	1,324	54%	1,312	54%	1,313	54%
Low	49	2%	66	3%	65	3%
spruce-fir*						
High	2,450	52%	2,156	46%	1,837	39%
Moderate	2,048	44%	2,290	49%	2,617	56%
Low	176	4%	227	5%	219	5%

\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012

### Effects to Ecological Succession (Seral Stages)

A good ecological indicator of forest health at a large scale is the proportion of successional stages within the landscape as compared to what would be expected under a natural, functioning disturbance regime (i.e. no fire suppression). Creating this natural mixture of seral stages within the landscape meets

the habitat needs of many wildlife species, creates greater forest resistance and resiliency to insect and disease attack, and sustains species and age class diversity. One of the key objectives (Objective Veg. O1) of the Southern Rockies Lynx amendment is to: *“manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx”* (Chapter 1, section 1.7.1).

Under the implementation of both action alternatives the overall effect to seral stage composition within the planning area will be minor due to the scale required to effect change at a landscape level. These treatment alternatives are limited by agency budgets, industrial capacity and administrative constraints (Inventoried Roadless Areas). However, improvement in successional condition will occur under each action alternative, and this progress can be built upon with future mechanical and/or burning treatments, or using managed wild fires. Tables 20 through 22 display the expected change for the aspen, lodgepole pine and spruce/fir forest types.

Table 20. Landscape Proportion of Current and Post Treatment Seral Stage for the Aspen Forest Type

Seral Stage	Existing Condition		Alternative 1	Alternative 2
	Current Landscape Proportion	Target Proportion (VDDT Model)	Current Landscape Proportion	Current Landscape Proportion
early seral	3%	8 to 25%	6%	6%
mid seral	24%	23 to 38%	23%	23%
late seral	72%	23 to 55%	71%	70%

The projected change to the proportion of seral stages within the landscape for the aspen forest type will bring it closer to the natural condition (Table 20), although it remains outside of the expected natural range for early and late seral components. The proportion of early seral forest condition increases by three percent under both action alternatives. This is a result of the coppice treatments that will regenerate the aspen stands. The late seral stage is reduced by one percent under Alternative 1 and two percent under Alternative 2.

Table 21. Landscape Proportion of Current and Post Treatment Seral Stage for the Lodgepole Pine Forest Type

Seral Stage	Existing Condition		Alternative 1	Alternative 2
	Current Landscape Proportion	Target Proportion (VDDT Model)	Current Landscape Proportion	Current Landscape Proportion
early seral	3%	8 to 14%	4%	4%
mid seral	19%	23 to 38%	19%	19%
late seral	78%	40 to 55%	76%	76%

The projected change to the proportion of seral stages within the landscape for the lodgepole pine forest type will bring it closer to the natural condition (Table 21), although it remains outside of the expected natural range for early and late seral components. The proportion of early seral forest condition increases by one percent under both action alternatives. This is a result of the clearcut, patch cut and fuel break treatments that will regenerate the lodgepole pine stands. The late seral stage is reduced by two percent under both Alternative 1 and Alternative 2.

Table 22\*. Landscape Proportion of Current and Post Treatment Seral Stage for the Spruce/Fir Forest Type

Seral Stage	Existing Condition		Alternative 1	Alternative 2
	Current Landscape Proportion	Target Proportion (VDDT Model)	Current Landscape Proportion	Current Landscape Proportion
early seral	2%	27 to 32%	3%	3%
mid seral	10%	20 to 30%	10%	10%
late seral	88%	31 to 53%	88%	88%

\* the figures for the spruce-fir cover type are no longer valid due to an extensive spruce bark beetle epidemic that has infested the planning area starting in 2012

Table 22 depicts the condition of the spruce-fir forest type within the landscape prior to the spruce bark beetle epidemic that has infested the planning area. Given the heavy spruce mortality observed from this epidemic, the effect will likely be to convert the entire cover type to an early seral condition. Where there is a larger component of aspen and sub-alpine fir species, a mid-seral condition may remain.

### Effects to Forest Regeneration

Stand replacing forest regeneration will occur as a result of the coppice, clearcut, patch cut (fuel break and strips), dwarf mistletoe control and the aspen burn treatments. These treatments are designed to

mimic the stand replacing disturbance processes of the aspen and lodgepole pine forest types. Due to the effects of fire suppression over the past few decades, there is a lack of regeneration within these forest types.

Regenerated stands created by the clearcut, coppice, aspen burn, patch cut and dwarf mistletoe treatments would result in a 635 acre increase under Alternative 1, and a 490 acre increase under Alternative 2. Within Alternative 1, there will be 220 acres of new aspen regeneration, and 403 acres of lodgepole pine regeneration. Similarly, the implementation of Alternative 2 is expected to create 115 acres of aspen regeneration and 396 acres of lodgepole pine. A considerable proportion of both the aspen and lodgepole pine forest types within the planning area are mixed with other more shade tolerant species and are at risk of severe decline or elimination from portions of the landscape – through ecological succession. The regeneration disturbance created by these treatments will help to maintain these pioneer forest types within the landscape, and provide valuable early seral forest conditions.

In addition to the stand replacing disturbance described above, there will be pockets of regeneration created within the partial cutting and prescribed burning treatments (mixed conifer management burn). These pockets of regeneration will be imbedded within the context of the mature residual stand structure and will provide disease and insect resistance, increased age diversity and the maintenance of species diversity (especially aspen) within the treatment stands. These partial tree removal treatments are mainly within the cool moist mixed conifer and spruce/fir forest types, and will mimic the gap dynamic (or climax) disturbance pattern of spruce/fir type, and the mixed severity, mosaic fire regime of the cool moist mixed conifer forest type. It is difficult to quantify the area of land that will be in regeneration pockets under these prescriptions. Within the Group Selection treatment the stands will average 25% of the area in regeneration openings. The mixed conifer management burning of Alternative 2 is expected to result in 40% of the area in stand replacing pockets.

An important component of successful aspen regeneration is the protection of the new sprouts from browsing pressure caused by ungulates and livestock (Shepperd, 2000). Once the sprouts reach a height of 10 to 15 feet, they are generally outside the vulnerability range, and will develop into tall, good quality aspen stands. Typical, healthy aspen root systems will produce prolific sprouting after stand replacing disturbance (Shepperd, 1996). This vegetative spouting (coppice) exhibits rapid height growth within the first few years, and can be as much as 3 to 5 feet per year. Most of the aspen stands within the planning area that are proposed for treatment have typical root systems that have not experienced significant decline, and are expected to produce adequate sprouting to successfully regenerate these stands. Where aspen cutting occurs, treatments will be designed to produce large areas of sprouting within a short time period to disperse the browsing impact from elk, deer and livestock. Additionally, treatment units will be monitored and fencing or other protections will be used where browsing damage indicates that stocking standards will not be met.

### 3.4.3. *Cumulative Effects, Forest Resources – Alternatives 1 and 2*

Timber harvesting has been recorded as early as 1900 in the planning area at a low level. Harvesting operations increased in scale after the mid 1940's, but have remained a relatively small portion of the total land area (3% to 7% per decade on a watershed basis). Fire suppression was instituted in the early 1900's, and has had a significant influence on the condition of the vegetation within the planning area. An active prescribed burning program has been implemented since the early 1980s with an average of 297 acres of burning per year. Recently, this program has including the use of wildfire for resource benefits (52 acres in 2007). Prescribed burning has mainly occurred in the shrub and grass vegetation types, and has had only a minor influence on the forested vegetation of the planning area.

Vegetative treatments have occurred over the past few decades on National Forest land within the Cochetopa Hills boundary using timber sales and burning projects. Table 11 displays the acreage and percent of area for all known vegetation management related ground disturbing activities within the major watersheds (94,041 acres) of the planning area since 1950.

The forest management activities over the past three decades are the most relevant to consider for cumulative impacts to the forest resource. During the 1980s 7% of the planning area had some form of soil disturbing activity, in the 1990s management activities affected 11% of the area, and during the 2000s activities dropped significantly to 1% of the planning area - see Table 11 .

The management activities proposed under each of the action alternatives of this proposal will span for the next decade and can be considered to represent the expected impact to the forest resource within the planning area – assuming that the spruce salvage activity is roughly proportional to the spruce-fir treatments that were planned under this proposal (and will now be remove from this decision).

If Alternative 1 is implemented, over the next decade, there would be an additional 5,960 acres of mechanical harvest treatment (6% of the planning area), and 5,897 acres prescribed fire treatment (6% of the planning area). Of these treatments, 616 acres (1% of the planning area) would be in high impact, stand replacing activities, the remainder of treatments would retain portions of the existing forest cover.

Under Alternative 2, less mechanical treatment would be used with 4,104 acres of mechanical harvest treatment and 7,336 acres of prescribed fire treatment (4% and 8% of the planning area, respectively). There would be some level of mechanical treatment on some of the “mixed conifer management burn” units when pre-treatment of fuels is needed. This impact will generally be less than a pure mechanical treatment would be. Within Alternative 2, stand replacing disturbance would occur on 456 acres (< 1% of the planning area).

Under both action alternatives the use of best management practices will be employed as defined in the design criteria for this project, and negative impacts are expected to be minimized. As the forest stands respond to the treatments and vegetation becomes established and/or recovers, the negative effects will fade and the forest condition will return to a natural functioning state.

Positive effects include increases in forest species and age diversity, and better resilience to insect, disease and wildfire disturbance as described in the direct effects section above. These improved conditions will persist for many decades into the future, and can be used to build future treatments to return the landscape to the balance created by a functioning disturbance regime.

### 3.5. Range Resources

#### *3.5.1. Existing Conditions – Range Resources*

The Cochetopa Hills Vegetation Management Project has six allotments that fall within the project area (Figure 7). Livestock grazing in the project area is exclusive to cattle, and the allotments have varying grazing seasons. There is a total of 47.7 miles of fence in the project area, and 15 grazing improvements including water systems and dam structures (Table 23).

Figure 7: Map showing range resources in relationship to project area.

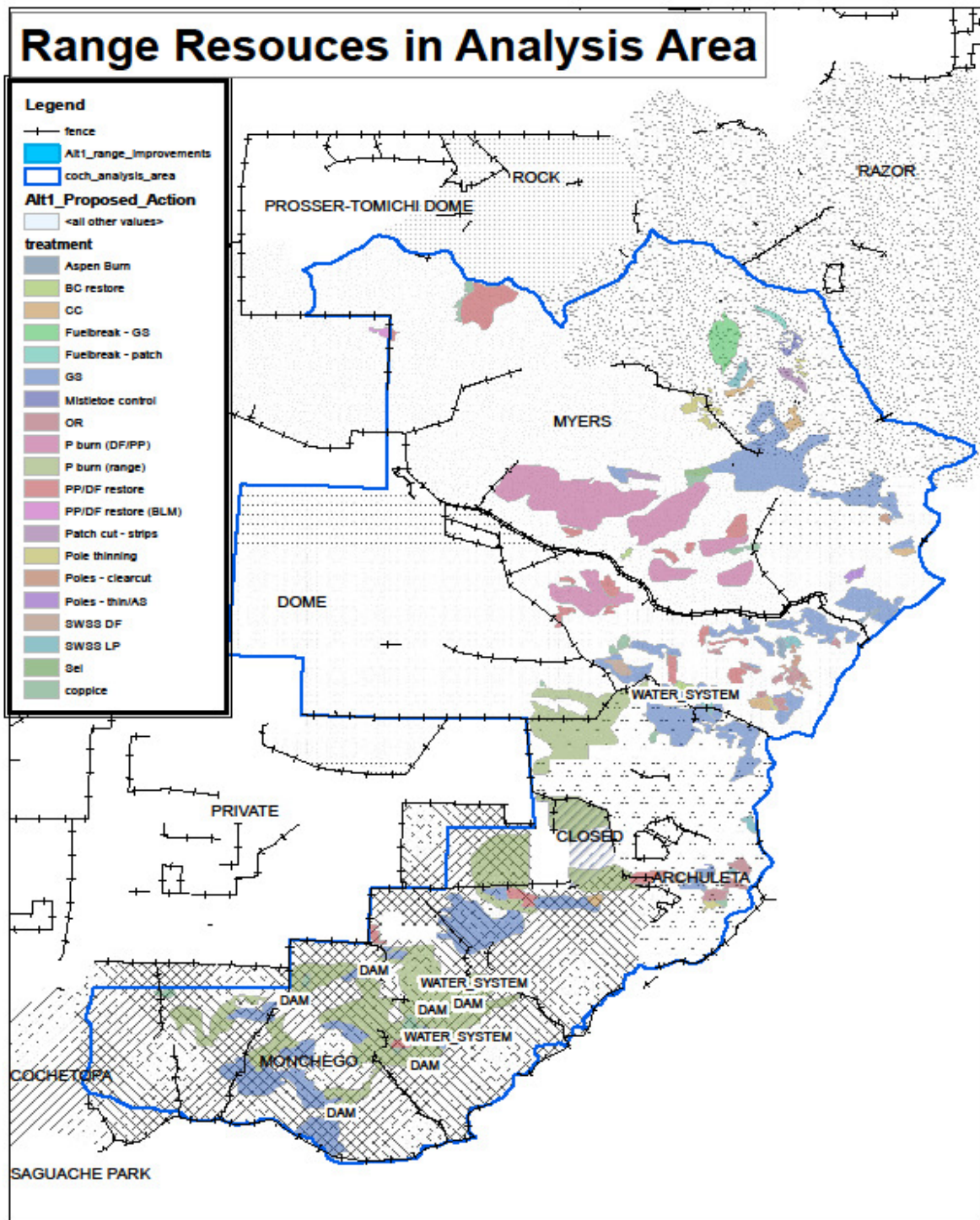




Table 23: Summary of Range Resources and Management in Project Area.

Allotment Name	Acres in Project Area	Miles of fence	Number of improvements	Permitted Livestock Use	Grazing System	Season of Use
Archuleta	1366.8	16.2	-	55 cow/calf pair	Deferred rotation	6/16-9/15
Closed	324.1	5.5	-	-	-	-
Dome	2115.4	5.4	1	Up to 190 cow/calf pair	Variable season and numbers with a deferred rotation	6/15-10/10
Monchego	4781.1	15.5	14	212 calf/cow pair Forest Service; 54 calf/cow pair BLM	Deferred Rotation	6/11-10/10
Myers	2469.4	3.3	-	77 Cow/calf pair Forest Service; 37 calf/cow pair BLM	Deferred rotation	8/5-10/05
Razor	787.1	1.8	-	135 cow/calf pair	Permittee waived it back as a Forage Reserve when pastures are grazed it is a deferred rotation.	7/1-9/30
Rock	0.1		-	116 yearlings	Deferred rotation	7/1-9/30

Domestic livestock grazing generally occurs in open areas with low tree cover where forage plants are most abundant. Transitory range, which can convert to forest vegetation over relatively short timespans of 10 to 20 years, can have high tree cover and little forage in the understory. Besides foraging, livestock also utilize areas with high tree cover for shade and relief from insects, and may trail through transitory range as they move between primary use areas.

### 3.5.2. Direct and Indirect Effects, Range Resources – Alternatives 1 and 2

#### Management and Infrastructure, Alternatives 1 and 2

Direct effects on grazing activities would be limited in forested areas that receive relatively little use by livestock. Livestock do not currently prefer forest vegetation types because soil characteristics and canopy cover result in less forage production than that produced on grasslands. Instead, use of forest areas tends to be more associated with livestock seeking shade or relief from insects on the periphery of primary rangelands. Therefore the majority of vegetation management activities are not expected to

occur on or discourage use of primary forage sources within the allotments. Livestock may travel through areas of thick timber to get from one preferred grazing area to another or to access water, so there is potential for management activities to interrupt trailing in some instances, but such occurrences would be short-lived. The use of prescribed fire may result in short-term effects by reducing grazing opportunities in treated areas during and immediately after treatment. However, access could be restored as soon as the following grazing season.

Other possible direct effects to range resources include damage to fences or other structural improvements, or leaving gates open in order to facilitate the movement of equipment. In either instance, the ability to effectively distribute livestock within the allotments could be reduced for short periods of time, until necessary repairs could be made and/or livestock returned to their proper location. These types of occurrences could result in additional administrative work or effort on the part of the permittee, but are expected to be minimized through the identification of improvements within the project area and implementation of applicable design criteria.

**Design Criteria for Range**

During management operations, minimize the disturbance of natural parks especially from the impacts of heavy equipment.

All fences and cattleguards will be identified in the timber sale or service contract as protected improvements. Cattle guards and fences will be maintained during operations to insure prevention of unauthorized livestock use.

**Forage**

Forest forage production generally correlates with forest canopy cover once average tree canopy exceeds 35% (Garrett, 2000). Once overstory canopy cover increases beyond that threshold, understory plant production can decline significantly. Conversely, removal or thinning of overstory canopy can stimulate growth. Specific understory response in the project area would likely resemble other southern Rockies ecosystems where significant relationships have been documented between potential plant communities and factors such as slope, aspect, temperature, moisture, and soils (Coop, 2007). Researchers in the Jemez Mountains found general patterns whereby dry mesic sites tended to support shrubs and sub-shrubs in the forest understory, and moist mesic sites tended to support herbaceous species in the forest understory (Muldavin, 2003). In the same southern Rockies location, forbs became more common in forest understories with increasing distance from the edges of grasslands and meadows. Grasses were more abundant where forest and woodland vegetation lay adjacent to grasslands, or where forests had encroached into grassland and meadow plant communities.

Potential vegetation changes that could be beneficial to livestock would likely be linked to existing understory composition and related physical attributes of the site. Whether those benefits persist over the short- or long-term would likely depend not only on the degree to which forest canopies are altered, but on the underlying soil type as well. Broadly speaking, soil taxonomic orders within the project area consist of "forest soils" (Alfisols) and "grassland soils" (Mollisols). The unique attributes of each soil type (such as nutrient availability, microbe communities, texture, etc.) lend themselves to supporting certain

suites of vegetation. For instance, grasslands can be resistant to encroachment (Coop, 2007) or at least the rate of change from grassland to forest can require longer periods of time than successional shifts within some forest plant communities. In this project area, the majority of grassland soils are located within burn treatments prescribed for rangeland maintenance. These areas tend to be the primary foraging areas for livestock and will likely remain that way over the long term as significant changes in plant composition are not anticipated. The greatest plant response/change to grassland areas would be expected to occur on mollisols that currently support forest encroachment; typically found around the edges of grassland complexes. Burning and mechanical treatments in those areas would likely increase and maintain desirable forage species over the long-term. This contrasts with treatments on forest soils where expected change, while beneficial, is likely to be more short-term. Transitory range such as this is commonly thought to have a ten to twenty year functional lifespan.

Vegetation cover types in the project area include grasslands, riparian, aspen, bristlecone pine, spruce-fir, lodgepole pine, cool-moist and warm-dry mixed conifer, and ponderosa pine forests. Projections of forage response to treatments were calculated based on the prescriptions for alterations to canopy and stand structure (See section 3.4.1). It was assumed that maintenance in in forest canopy cover of 40% or lower, or treatments in vegetation types without canopy resulted in maintenance in forage levels (Table 24). Treatments occurring in grasslands, both prescribed fire and mechanical were assumed to have a short-term increase in forage, but more of a maintenance effect for forage over the long term. Where canopy covers were reduced from levels of above 40% to below 40%, an increase in forage response was assumed. Where treatments resulted in less than a reduction to 40% canopy covers, it was assumed there was no change in forage.

Table 24: Anticipated forage response presented in percentages of total acres per vegetation type in project area.

Forage Response	Maintenance		Increase		Treated, no change		No Treatment, no change		
	Alt1	Alt2	Alt1	Alt2	Alt1	Alt2	Alt1	Alt2	Alt3
Mountain Grassland	21%	21%							21%
Riparian Vegetation			1%	1%					1%
Aspen Forest			1%						2%
Aspen Forest with <100% hardwood			8%	7%				1%	8%
Bristlecone Pine/Limber Pine Forest	6%	6%	4%	3%				1%	10%
Lodgepole Pine Forest	1%	1%	13%	12%	4%	4%		1%	18%

Forage Response	Maintenance		Increase		Treated, no change		No Treatment, no change		
	Alt1	Alt2	Alt1	Alt2	Alt1	Alt2	Alt1	Alt2	Alt3
Cool-moist mixed conifer forest	2%	2%	14%	14%	3%	3%			19%
Warm-dry mixed conifer forest	1%	1%	4%	3%	1%	1%		1%	6%
Ponderosa Pine Forest	4%	4%	3%	3%					7%
Spruce-fir Forest			3%	3%	4%	4%			7%
Grand Total	<b>36%</b>	<b>36%</b>	<b>52%</b>	<b>48%</b>	<b>12%</b>	<b>13%</b>	<b>0</b>	<b>4%</b>	<b>100%</b>

Where canopy covers were in forested vegetation types that are not reduced below 40%<sup>1</sup> canopy cover, there will be relatively little benefit to understory species for forage benefit due to maintenance of dense canopy. Where tree cover is reduced below 40%, the opening of the overstory is anticipated to increase abundance of understory species. Where tree cover is maintained at cover values of 40% and below, maintenance will benefit understory species as described below (please refer to the specialist report in the project record for full account). The understory species are derived from both field observations and from data derived from the Integrated Resource Inventory Project.

Treatments in grassland and upland shrub cover types are likely to decrease tree and shrub encroachment. Treatments will likely favor plants like Parry's oatgrass, Arizona fescue, prairie Junegrass, mountain muhly, muttongrass, and assorted forbs. Treatments are not expected to favor woody species like shrubby cinquefoil, big sagebrush, and spruce, fir, and pine encroachment.

The primary treatment type anticipated in riparian would be prescribed fire, as design features exclude most mechanical treatments. Where no treatment occurs there is no anticipated response. Prescribed fire treatments where there is no overstory will result in maintenance in grass and forbs whose composition and density will be affected more by soil moisture. In riparian areas with a high shrub component, short-term increases in herbs would be expected where sprouting shrubs (such as willows or shrubby cinquefoil) are present and long term increases where non sprouting species (sagebrush) occur. Where there is forested overstory, treatments resulting in a reduction of overstory will likely encourage understory growth (shrub and herb).

In areas currently occupied by aspen, including aspen forest sites or areas where aspen is currently a sub-dominant component of another forest type, woody browse is expected to increase after

<sup>1</sup> Though literature describes 35% as being the canopy cover value where understory response is triggered, the best available data has breaks in canopy cover at 40% which will be utilized as a proxy for analysis purposes.

treatment. Grasses and forbs will initially increase along with aspen, but those plant functional groups are expected to decrease in abundance as the aspen canopy begins to close over time.

In opening the overstory in all forest types, benefit of species such as Arizona fescue, Idaho fescue, mountain muhly, and Geyer's sedge is anticipated. Conditions for upland browse species like wax currant would likely benefit as well. Localized opportunities for regeneration of aspen browse may also be present. Lodgepole pine treatments may also benefit the same species in addition to sub-shrubs like whortleberry. While some of the grasses and graminoids listed above may increase in spruce-fir and mixed conifer treatments, shrubs like gooseberry currant and kinnikinnick also have the potential to increase. Open canopy would also benefit non-browse species like kinnikinnick, Oregon boxleaf, and common juniper. Burning may stimulate non-browse species like kinnikinnick and Oregon boxleaf, and decrease species like common juniper. While aspen may be a component of the species mix in all forest types in the project area, it appears that the species may benefit most in spruce-fir and lodgepole pine types.

Overall, vegetation treatments under both alternatives are expected to have beneficial effects on range resources. Prescribed fire can be an effective means of maintaining desirable vegetation (Briske, 2011) and can eliminate encroachment by trees or shrubs in grassland cover types that might otherwise result in reduced production of herbaceous species over time. Altering stand structure and reducing canopy cover in forested areas can also benefit forage resources. Fire can reduce downed woody debris thereby increasing access to some foraging areas. Thinning dense vegetation would have similar effects on access with the added benefit of potentially encouraging desirable plant growth on the forest floor. Because canopy cover and understory production have an inverse relationship; overstory removal is likely to create transitory rangeland within the affected allotments.

The maintenance and increases in the amount of and access to available forage with both action alternatives, would benefit range resources over both the short- and long-term by providing managers more flexibility in how they can adjust the timing, intensity, and duration of grazing across the project area. Greater availability of forage resources would result in greater opportunities for livestock distribution (when and where grazing occurs). Creation of new foraging opportunities would allow managers to utilize more of the landscape, spreading use over a wider area and reducing the potential for overutilization of forage at any one location (by livestock or through overlap with wildlife). Effective animal distribution, in concert with the maintenance or improvement of desirable vegetation would likely assist in continuing to meet or moving towards satisfactory range conditions within the grazing allotments.

#### **Direct and Indirect Effects Unique to Alternative 1**

Alternative 1 would implement the most mechanical treatment (5,960 acres) which potentially affects the most overstory canopy. Alternative 1 also proposes to burn 5,897 acres. A substantial portion of those acres (4,143) are composed of primary range types and preferred livestock foraging areas. Prescribed fire would likely result in maintenance of desirable grassland forage species (grasses and

forbs), and structure/composition of forest vegetation. Alternative 1 has the potential to increase approximately 3% in forage resources than Alternative 2, and 52% more than Alternative 3 (Table 24). This increased benefit will primarily be in transitory range, and will likely be short term.

#### **Direct and Indirect Effects Unique to Alternative 2**

Alternative 2 would implement mechanical treatment on 4,104 acres within the project area. Alternative 2 proposes to burn 7,336 acres. 4,143 of those acres are on primary range types and preferred livestock foraging areas. Other areas targeted for burning would be the same as Alternative 1 except for the addition of 1,439 acres of treatment in mixed conifer vegetation. The mixed severity nature of the mixed conifer treatment also has the potential to create additional transitory range through stand replacement (projected to include 40% of total mixed conifer burn treatment acres). Although some transitory range would likely be created, the overall total (between fire and mechanical treatments) would be 3% less than Alternative 1.

#### **Direct and Indirect Effects Alternative 3**

Under Alternative 3, the no action alternative, no vegetation treatments would be implemented. Therefore there would not be any direct effects on livestock management or infrastructure. However, forest canopies would continue to increase in existing stands and total acres of forest may expand as trees continue to encroach into grassland areas. These factors, as well as continued shrub growth, would likely reduce existing transitory range and has the potential to reduce the size of primary and preferred rangelands over the long-term. A reduction in these acres has the potential to decrease grazing opportunities and increase overlap between livestock and wild ungulate use. Alternative 3 would have 36% less area of maintained forage base than both action alternatives. Alternative 3 would have 52% and 48% less area of increased transitory range than Alternatives 1 and 2 respectively.

### ***3.5.3. Cumulative Effects, Range Resources – Alternatives 1 and 2***

#### **Cumulative Effects of Alternative 1**

Past and ongoing activities in the project area include grazing, noxious weed management, recreation, roads and travel management, and timber harvest and vegetation management. Possible cumulative effects to range resources would most likely affect or be affected by grazing, noxious weed management, and timber harvest and vegetation management. No negative cumulative effects are anticipated in concert with grazing activities because the project would implement applicable design criteria and the range program would continue to implement Allotment Management Plans that protect and maintain resources. No negative cumulative effects are anticipated in concert with noxious weeds either, because of design criteria that would be implemented and treatments that could potentially continue under Forest programs. Positive cumulative effects associated with timber and vegetation management are expected due to the contributions that this project would make to the creation/renewal of transitory range and maintenance of primary rangelands. These effects would likely lead to beneficial outcomes for grazing overall.

**Cumulative Effects of Alternative 2**

Cumulative effects for Alternative 2 would be similar to Alternative 1.

**Cumulative Effects of Alternative 3**

There are no actions, hence no cumulative effects for Alternative 3.

### 3.6. Soil Resources

Soils in the analysis area were mapped during the Cochetopa Area Soil Survey (USDA, 2008). The survey is considered to be a 3<sup>rd</sup> order level survey mapped at a 1:24,000 scale, which is a level of mapping intensity intended for areas with a single dominant use, where precise knowledge of small areas is not required. Soil surveyors use the concept of soil “map units” (MUs) to group soils that occur together in distinctive and repeating patterns across the landscape. Map units are the fundamental unit of soil mapping and are named according to the dominant soils that they contain; although because of natural variability “inclusions” of other soils may occur within them. Inclusions may have properties similar or dissimilar to the dominant soils in the map unit. Soil surveys are useful tools for identifying general suitability of land uses. However, because it is a 3<sup>rd</sup> order survey, as well as the inherent variability of soils, specific project proposals generally need to be reviewed to confirm slope, depth, drainage, and other soil and site characteristics that may affect a particular use.

#### *3.6.1. Existing Conditions – Soil*

The general Cochetopa area falls within a prominent rain shadow due to its location between the San Juan mountain range to the southwest and the Sangre de Cristo range to the southeast. Total precipitation within the analysis area averages about 17 inches per year and ranges from 13 to 25 inches. Soils have developed from extrusive igneous materials dominated by fine grained andesites and rhyolite (Day et al, 1999). They are cold, high elevation soils that support a range of plant communities from grasslands-sagebrush to mixed conifer and Spruce-fir; and are generally deep (40” to 60”+), well to somewhat excessively drained, and contain considerable amounts of coarse fragments (gravel to cobble size materials) within the profile. The combination of soil and climatic characteristics results in low to very low amounts of available moisture.

Twenty separate MUs are present in the analysis area (see Figure 8 and Table 25.), although two account for nearly 60% of the total (MUs 113 and 117). The 113- Goosepeak, cool Seitz unit is most common in the southern portion of the area while the 117- Goosepeak-Snowdon is generally more prevalent to the north.

Figure 8. Spatial Distribution of Soils within the Cochetopa Hills Analysis Area

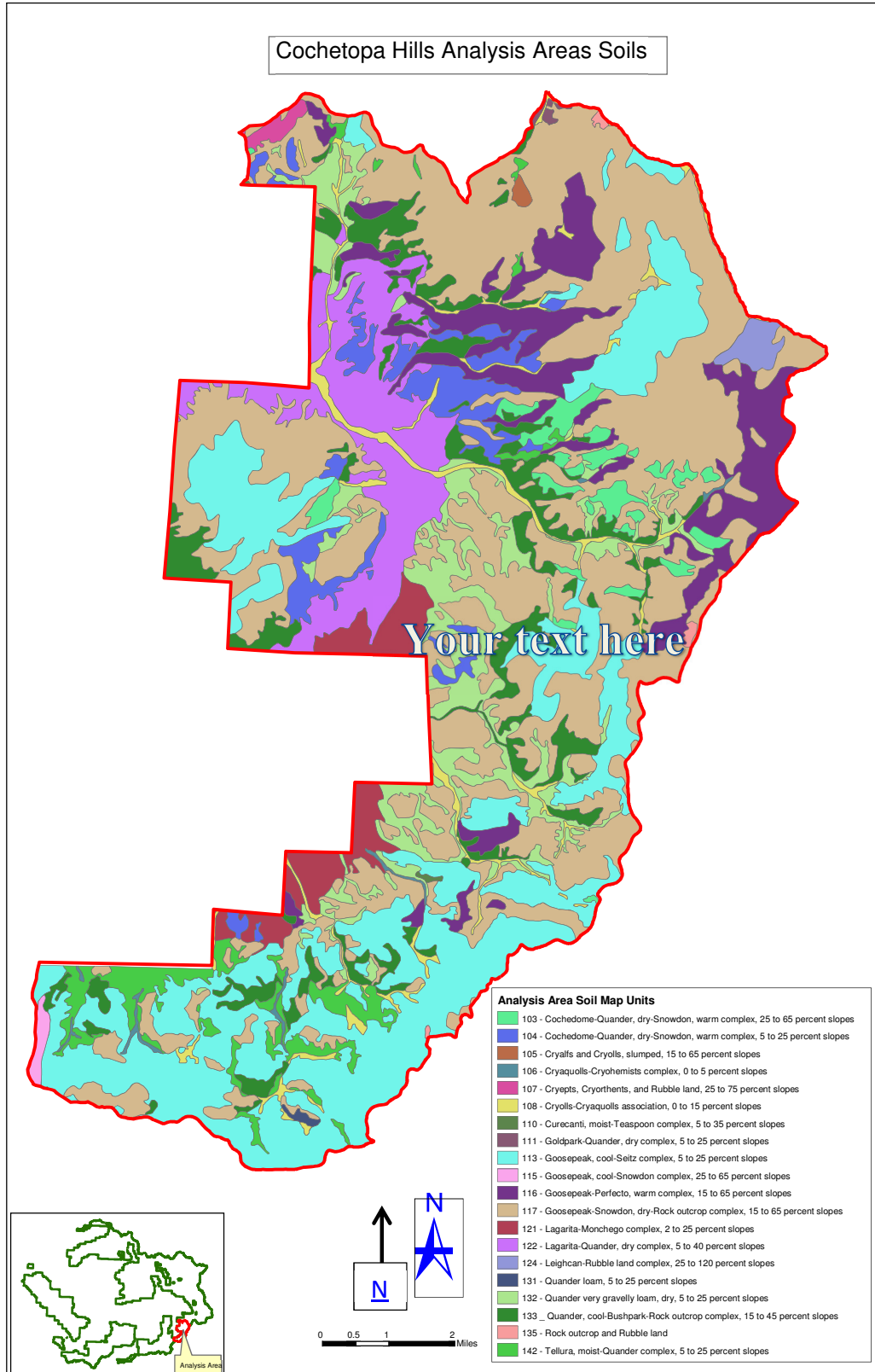




Table 25. Soil Map Units and Extent within the Cochetopa Hills Analysis Area.

MU Symbol	Map Unit Name	MU Acres	% of Total
103	Cochedome-Quander, dry-Snowdon, warm complex, 5 to 25 percent slopes	2,129	3.5
104	Cochedome-Quander, dry-Snowdon, warm complex, 25 to 65 percent slopes	1,223	2.0
105	Cryalfs and Cryolls, slumped, 15 to 65 percent slopes	60	0.1
106	Cryaquolls-Cryohemists complex, 0 to 5 percent slopes	176	0.3
107	Cryepts, Cryorthents, and Rubble land, 25 to 75 percent slopes	168	0.3
108	Cryolls-Cryaquolls association, 0 to 15 percent slopes	1,316	2.2
110	Curecanti, moist-Teaspoon complex, 5 to 35 percent slopes	23	0.0
111	Goldpark-Quander, dry complex, 5 to 25 percent slopes	51	0.1
113	Goosepeak, cool-Seitz complex, 5 to 25 percent slopes	13,586	22.2
115	Goosepeak, cool-Snowdon complex, 25 to 65 percent slopes	142	0.2
116	Goosepeak-Perfecto, warm complex, 15 to 65 percent slopes	4,620	7.6
117	Goosepeak-Snowdon, dry-Rock outcrop complex, 15 to 65 percent slopes	21,767	35.6
121	Lagarita-Monchego complex, 2 to 25 percent slopes	1,614	2.6
122	Lagarita-Quander, dry complex, 5 to 40 percent slopes	4,238	6.9
124	Leighcan-Rubble land complex, 25 to 120 percent slopes	309	0.5
131	Quander loam, 5 to 25 percent slopes	42	0.1
132	Quander very gravelly loam, dry, 5 to 25 percent slopes	3,994	6.5
133	Quander, cool-Bushpark-Rock outcrop complex, 15 to 45 percent slopes	3,986	6.5
135	Rock outcrop and Rubble land	63	0.1
142	Tellura, moist-Quander complex, 5 to 25 percent slopes	1,599	2.6

General erosion hazard ratings are available that characterize the potential risk of soil losses after any disturbance that exposes bare mineral soil. The ratings are based on soil erodibility factors and prevailing slope (NRCS, National Forestry Manual, 1998), with slope ultimately determining the level of risk for these particular soils. Ratings based on available 30 meter digital elevation model (DEM) data are presented for all lands within the analysis area in Table 26. The modest topography present in the analysis area is reflected by the nearly 90% of the area that has a slight or moderate risk.

Table 26. Soil Erosion Risk Ratings and Extent Across the Analysis Area.

Erosion Risk	Slope %	% of Total Area
slight	< 15	35.4
moderate	15 - 35	53.6
severe	36 - 50	9.7
very severe	> 50	1.3

### 3.6.2. Direct and Indirect Effects, Soil – Alternatives 1 and 2

Treatments are proposed on 13 soil mapping units (MUs) across the analysis area. Table 27 summarizes the proportion of both mechanical vegetation treatments and prescribed burn treatments on each soil MU by alternative. In both alternatives, over 95% of the potential vegetation treatments occur on three soil MUs (113,116, and 117). All three include the Goosepeak family as the predominant component. Prescribed burning is distributed more evenly among the soils, although six soil MUs (103,113,117,132,133, and 142) account for roughly 85% of the total under each alternative. The proposed treatments are overwhelmingly on sites with slight to moderate erosion risk (Table 28).

Table 27. Proportion of Proposed Treatments by Soil Mapping Unit for Action Alternatives.

MU Symbol	MU Name	Mechanical Vegetation Treatments		Prescribed Burning Treatments	
		Alt 1 % of Total	Alt 2 % of Total	Alt 1 % of Total	Alt 2 % of Total
103	Cochedome-Quander, dry-Snowdon, warm complex, 5 to 25 % slopes	0.1	0.1	11.5	9.3
104	Cochedome-Quander, dry-Snowdon, warm complex, 25 to 65 % slopes	0.6	0.9	8.4	6.8
106	Cryaquolls-Cryohemists complex, 0 to 5 % slopes	0.1	0.1	0.9	0.8
108	Cryolls-Cryaquolls association, 0 to 15 % slopes	0.3	0.2	2.3	2.0
110	Curecanti, moist-Teaspoon complex, 5 to 35 % slopes	< 0.1	0.0	0.2	0.2
113	Goosepeak, cool-Seitz complex, 5 to 25 % slopes	39.9	37.0	10.1	19.8
116	Goosepeak-Perfecto, warm complex, 15 to 65 % slopes	9.6	13.2	3.0	2.4
117	Goosepeak-Snowdon, dry-Rock outcrop complex, 15 to 65 % slopes	47.2	47.3	22.0	24.6
121	Lagarita-Monchego complex, 2 to 25 % slopes	0.0	0.0	1.3	1.1
122	Lagarita-Quander, dry complex, 5 to 40 % slopes	0.0	0.0	0.5	0.4
132	Quander very gravelly loam, dry, 5 to 25 % slopes	1.2	0.6	15.2	12.8
133	Quander, cool-Bushpark-Rock outcrop complex, 15 to 45 % slopes	0.3	0.4	11.9	9.6
142	Tellura, moist-Quander complex, 5 to 25 % slopes	0.5	0.2	12.5	10.2

Table 28. Proportion of Proposed Treatments by Erosion Risk.

Erosion Risk	Slope %	Mechanical Vegetation Treatments		Prescribed Burning Treatments	
		Alt 1 % of Total	Alt 2 % of Total	Alt 1 % of Total	Alt 2 % of Total
slight	< 15	37.7	33.2	45.2	46.2
moderate	15 - 35	61.3	65.9	49.4	49.4
severe	36 - 50	1.0	0.9	5.3	4.3
very severe	> 50	0.0	0.0	0.1	0.1

Site and soil conditions were examined in potential treatment areas throughout the analysis area during 2009 and 2010. Parent material is largely rhyolitic, with some ash flow influencing some soils in the area near Colorado Highway 114. Surface layers observed ranged from 6" to 12"+ in depth and were consistently gravelly loams and sandy loams (gravel content ranging from 15% to 35%). Sub-surface layers were loams to light sandy clay loams with even greater amounts of gravel present (25% to 50%). Rarely were soils encountered with finer textured clay loams or clays. The content of coarse fragments greater than gravel size (> 3"), ranged from 10% to 30% and were usually present at depths of 15" to 18" or more. These characteristics are within the range of the Goosepeak soil, although they tend to have less clay than is typical. The shallower to bedrock Snowdon and finer textured Seitz soils do occur, but were much less common ( $\leq 20\%$ ) within proposed treatment units.

Slopes observed within the proposed treatment units generally range from 15% to 30%, although short segments of  $\geq 35\%$  do occur. These field based observations support the erosion risk ratings presented above in Table 28. Harvest activities have occurred in the past, with interior skid trails still visible. No evidence of either surface erosion or compaction was found, and regeneration of all component tree species was occurring. Several system and temporary road segments were identified that resulted in concentration of surface runoff that has triggered gully erosion within a very short distance (~ 75 feet).

### **Mechanical Treatments**

Ground disturbance caused by mechanical equipment is a direct effect that is inevitable in the project. However, detrimental soil impacts caused by equipment operations (compaction, displacement, and rutting) or post-harvest erosion or pile burning will occur on a much smaller area. Detrimental impacts and quality standards are defined in the Region 2 Supplement to FS Handbook 2509.18. The potential for detrimental impacts is greatest when the soil is wet, or when soil is exposed on steep slopes. The actual extent of detrimental disturbance that occurs depends not only on the inherent soil and site characteristics, but also the weather conditions during operations, as well as contract administration.

The direct soil effects due to ground disturbance within treatment areas are expected to be minimal and of short duration. The risk of compaction and rutting damage is considered slight, given the notable

amount of gravel and larger sized material commonly found in the soil profiles, as well as the existing layer of surface organic materials commonly found. Residual slash and cull logs created during harvest will provide an additional buffer to potential machine impacts. Post-harvest erosion risk is limited as well, given the prevalence of slopes  $\leq 35\%$  and design criteria requiring retention of protective ground cover in the form of large wood and logging slash. Slash burning within treatment areas will be limited and severe effects restricted to burning of cull material concentrations at log landings.

The impacts related to primary skid trails, log landings, and temporary road construction will be of longer duration given the typical blading and repeated heavy use that they receive. Those impacts can be minimized by application of design criteria to limit the area of detrimental soil impacts due to concentrated use (compaction, litter and surface soil displacement, rutting, erosion, severe burning) to the Regional standard of 15% or less of an activity area. The aerial extent of skid trails within past harvest units examined in the Sargents Mesa T.S. (Gunnison RD) and LeRoux Creek T.S. (Grand Valley RD) ranged from 5% to 6.5% of an activity area (treatment unit). No damage was apparent as a result of the historic skid trails encountered during field work in this analysis area.

Alternative 1 has the potential for the greatest direct effect since more acres are proposed for mechanical treatment than Alternative 2. The No Action alternative has no near term risk and over the longer term a slight risk of increased erosion should a large scale severe fire occur.

No indirect soil effects are foreseen.

#### **Activity Fuels and Prescribed Burning Treatments**

The risk of soil damage by fire is based upon the impact of a moderate intensity fire that generates heat sufficient to consume the duff layer as well as the slightly decomposed organic soil layer underlying it. Potential damage is related to the impact of nutrient loss from the site and the risk for subsequent erosion.

Activity fuels treatment will vary, but project design criteria require maintenance of 10 to 20 tons/acre of coarse wood in part to provide protection from erosion and for future soil health and productivity. Intense heating and long duration burning is expected to be limited to cull material concentrations at landings or in small piles within harvest units. Only the soil MUs proposed for harvest activities would generate activity fuels. Of those, only the Snowdon soil component has a high vulnerability to fire damage given its shallow depth and limited accumulation of surface organic material. As described above, little Snowdon was actually observed in the project area and none supported commercial sized timber.

Prescribed fire treatments range from a low intensity under-burn in Douglas-fir and Ponderosa pine to mixed severity fires on range and mixed-conifer sites. The prescribed intensities are considered typical for those vegetation types under natural fire regimes. A greater number of soil MUs would potentially be affected versus activity fuels treatment. However, the Snowdon family remains the only one with a high vulnerability to a moderate intensity fire. Given the typically thin timber observed on Snowdon it is

unlikely to 'carry' or support a moderate intensity fire, at least over a significant area. The Quander and Bushpark soil components have a moderate vulnerability due to the lack of surface organic layers or shallow depth, and are also unlikely to carry a moderate intensity fire.

Fire lines and fuel breaks should utilize existing roads and natural features as much as possible to minimize construction impacts caused by fire line construction. Blading to expose bare mineral soil displaces the nutrient- and organic-matter-enriched surface horizon and increases the risk of erosion and spread of noxious weeds. The total length and width of constructed lines should be minimized. Given the limited vulnerability to fire and the controlled conditions under which prescribed burning occurs, a direct effect is unlikely under either action alternative. The No Action alternative has no near term risk; over the longer term, there is a slight risk of increased erosion should a large scale uncontrolled fire occur. No indirect soil effects are foreseen.

### **Gravel Source**

The proposed gravel pit occurs on and adjacent to a rock outcrop within an area correctly mapped as a 132 - Quander map unit. The site is situated immediately above FSDR 579, and lies some 250 feet above Home Gulch, an intermittent tributary to West Pass Creek. A pit development and reclamation plan should be developed for this site. It should include a phased development approach in order to reduce surface disturbance to the minimum necessary for efficient production; surface clearing and exposure should not outpace the expected need for material. Although soils are absent or thin, the plan should include salvage and stockpiling of any topsoil encountered to be used during reclamation to facilitate re-vegetation. To reduce the potential for long term sediment introduction to Home Gulch, provide site access from a point along FSDR-579 approximately 500 feet south of the site.

### *3.6.3. Cumulative Effects, Soil – Alternatives 1 and 2*

Historical uses and activities occurring within the sub-watersheds included in the analysis area are expected to continue at similar levels. Those that may have a cumulative effect on soil and water resources include canopy removal, livestock grazing, the existing road and trail system, and recreational uses. They are either widespread and of low intensity or limited in extent and high intensity.

Generally, areas of complete or nearly complete canopy removal and the existing road network pose the greatest risk of effects to water quality and soil resources. Summarized in Table 29 is the extent of canopy removal activities and system roads on national forest lands according to the three 6<sup>th</sup> level sub-watersheds in the analysis area. Canopy treatments considered include even-aged silvicultural treatments, commercial thinning operations, roller chopping, fuels chipping, and any permanent clearing of forested or brush-dominated cover types within the last 25 years and currently tracked in the "FACTS" data base system. Road acres are based on current "INFRA" data for NF system operational maintenance level 2-5 roads, and assume an average road cut and fill limit of 30 feet.

Table 29. National Forest Disturbance Acreage and Extent by 6<sup>th</sup> Level Sub-watershed.

Name	Treated acres	Road acres	Total acres	NF acres	% of NF	Forested acres	% of Forested
Archuleta Creek	260	240	500	25,350	2.0	18,049	2.8
Headwaters Razor Creek	599	75	674	22,146	3.0	19,626	3.4
West Pass Creek	1,347	311	1,658	27,828	6.0	18,706	8.9

Timber activities account for all the treated acres shown in the summary. The aerial extent of all these activities plus roads is far less than 10% of the national forest administered lands in each case. Even when evaluated based solely on the forested acres within each sub-watershed, the estimated extent of disturbance remains less than 10%. These levels are well below those considered necessary to affect runoff, and are less than the regional standard for detrimental soil impacts as well. Field observation in past treatment areas also suggest no widespread impairment to soil resources. As a result, cumulative effects to soil resources under either action Alternative are not anticipated.

### 3.7. Watershed Resources

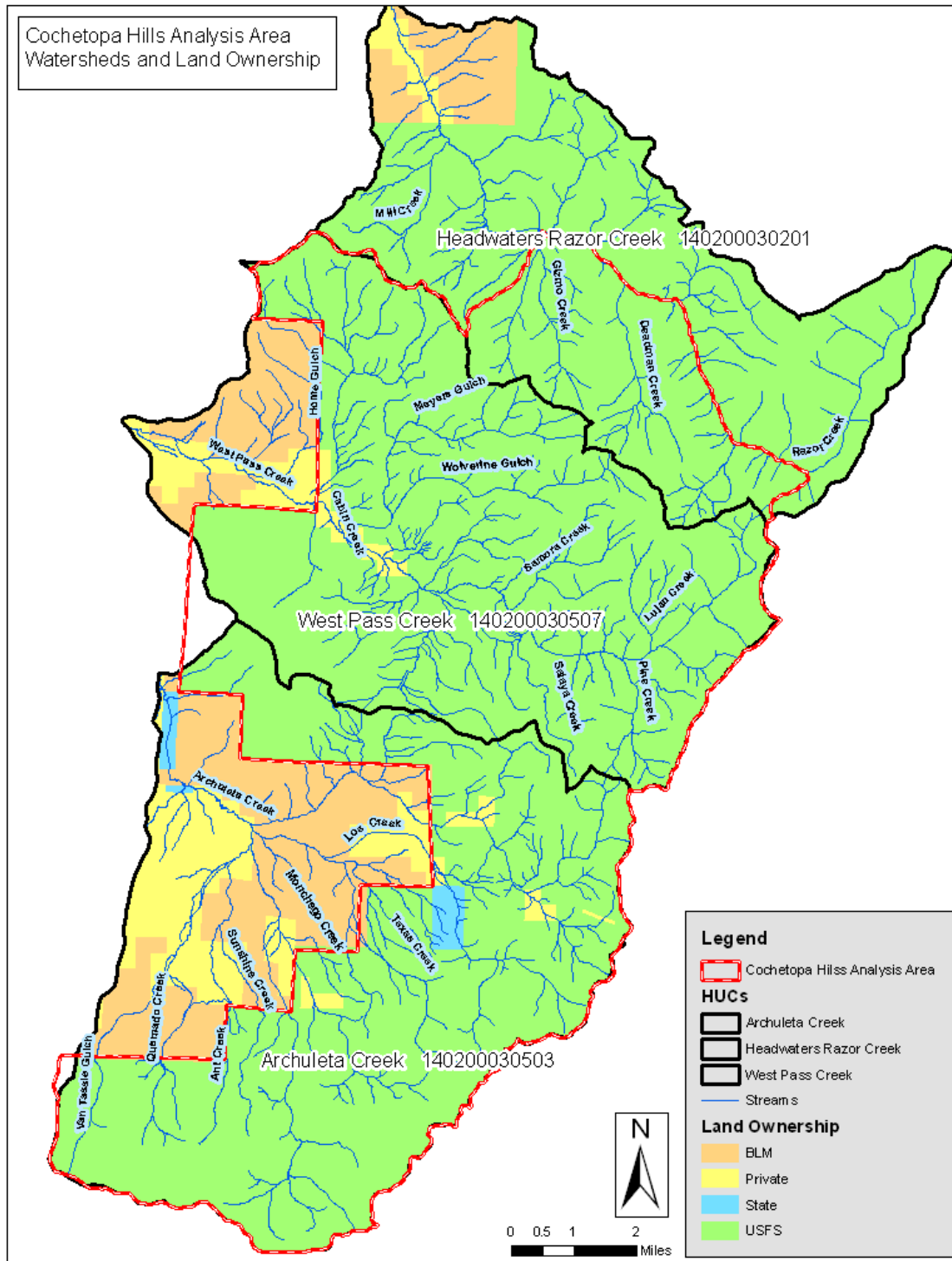
#### 3.7.1. *Existing Conditions – Watershed Resources*

The Cochetopa Hills Vegetation Management Project planning area includes portions of three sub-watersheds (6<sup>th</sup> level Hydrologic Unit Codes –HUCs) that drain into Tomichi Creek which is tributary to the Gunnison River, approximately 1 mile upstream of the Blue Mesa Reservoir. These three sub-watersheds are part of the Gunnison River basin (3<sup>rd</sup> level HUC). From west to east, the sub-watersheds are: Archuleta Creek (1040200030503), West Pass Creek (140200030507), and the Headwaters of Razor Creek (140200030201). Figure 9 shows the project planning area and the associated watersheds.

Most of the lands in watersheds that are part of the project planning area are federal lands managed by the United States Forest Service and Bureau of Land Management. Table 30 summarizes the land ownership of the three 6<sup>th</sup> code HUCs. A small portion of Archuleta Creek is owned by the State of Colorado, approximately 1.5% of the watershed area (567 acres). Private land ownership within the project planning area amounts to 7% of the total area of the watersheds. The BLM manages approximately 8% of both West Pass and Upper Razor Creeks and 21% of Archuleta Creek.

Table 30. Summary of Land Ownership of Cochetopa Hills Analysis Area HUCs.

Land Ownership		Private (acres)	STATE (acres)	BLM (acres)	USFS (acres)	TOTAL (acres)	%USFS
HUC 6 Code	Name						
140200030503	Archuleta Creek	4727	567	7713	24535	37542	65%
140200030507	West Pass Creek	1703	0	2784	27362	31849	86%
140200030201	Headwaters Razor Creek	536	0	1981	22161	24678	90%

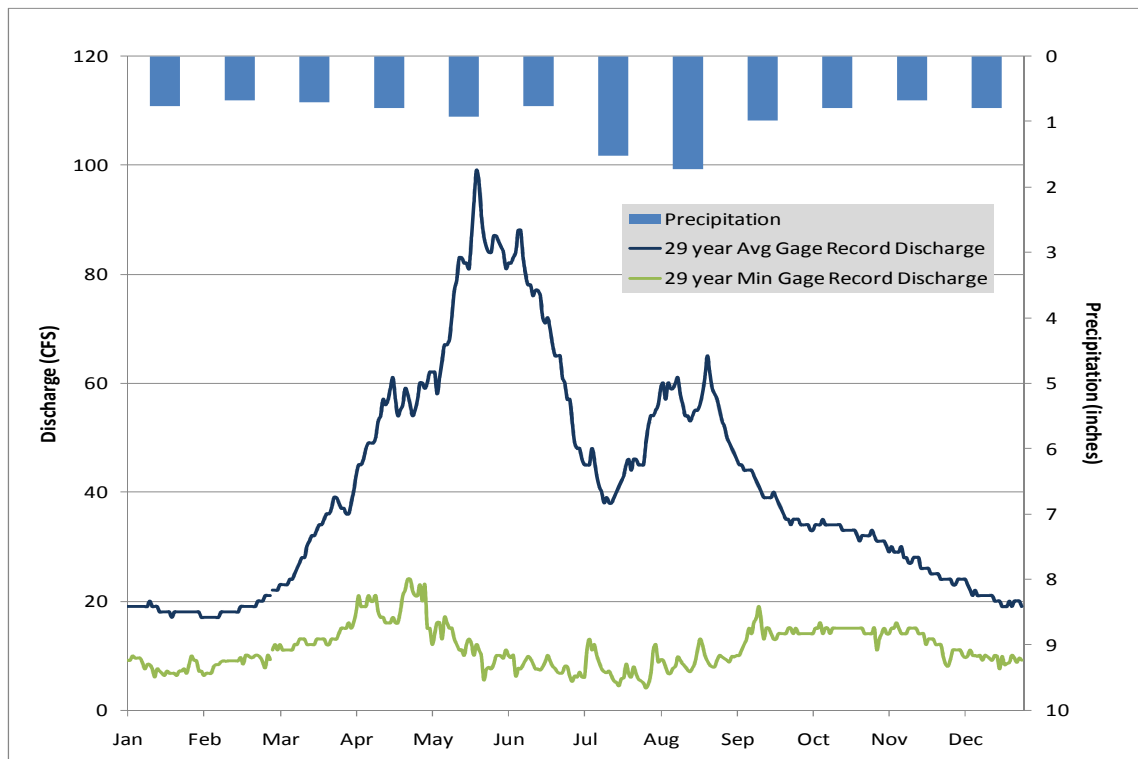
Figure 9. UGGS 6<sup>th</sup> code HUCs, streams, and land ownership of Cochetopa Hills analysis area.

Each of the three 6<sup>th</sup> code HUCs in the analysis area are drained by a number of named creeks (Figure 9). The Archuleta Creek watershed is drained by (from west to east): Van Tassle Gulch, Quemado Creek, Ant Creek, Sunshine Creek, Monchego Creek, Texas Creek, and Los Creek which are all headwater tributaries to Archuleta Creek that headwaters at Cochetopa Pass on the Continental Divide. The Archuleta Creek watershed drains primarily from the south-east to the north-west where it is tributary to Cochetopa Creek. The West Pass watershed is drained by Home Gulch, Meyers Gulch, Wolverine Gulch, Samora Creek, Salaya Creek, Spring Creek, and Lujan Creek, which headwaters at North Pass on the Continental Divide. West Pass drains predominately from the south-east to the north-west where it is tributary to Cochetopa Creek downstream of Archuleta Creek. The Razor Creek watershed drains from the south-east to the north-west where it is tributary to Tomichi Creek. There are two named creeks within the analysis area that drain out of the Razor Creek watershed, Gismo Creek and Deadman Creek.

Cochetopa Creek has a stream gage that captures discharge from both West Pass Creek and Archuleta Creek as well as the area drained by Los Pinos Creek. This gage is the USGS Cochetopa Creek gage (09118450), below Rock Creek Near Parlin, CO. The watershed at this gage yields an average of approximately 30,000 acre-ft of water at the stream gage. The hydrograph for this gage, Figure 10, based on the average daily flow for 29 years of record shows peak runoff occurring in mid-May followed by a second peak in August. The nearest weather station to the project area is located near Cochetopa Creek at an elevation of 8,000 feet. The annual average precipitation at this weather station for 51 years of record is 11.1 inches. The precipitation timing explains the bimodal hydrograph recorded at the stream gage that shows a peak in early May from snow melt and a second, smaller peak in August and September from late summer precipitation.



Figure 10. Average daily hydrograph of Cochetopa Creek Gage USGS 09118450 (29 years of record) along with monthly average precipitation at Cochetopa Creek weather station (51 years of record).



### Water Quality

The Colorado Water Quality Control Commission (CWQCC) is responsible for the identification and designation of water uses, beneficial uses, and the establishment of water quality standards to protect these uses. The designated uses identified for water bodies on national forest lands in the Cochetopa Hills Analysis area are: Class 1 Cold Water Aquatic Life, Class 2 Recreation, Agricultural, and Water Supply. Class 1 Cold Water Aquatic Life waters are defined by the CWQCC as sustaining a wide variety of cold water biota. Class 2 Recreational waters are defined as having the potential to be used for primary contact recreation. Agricultural Waters are suitable for irrigation of crops and are not hazardous as drinking water for livestock. Water supply waters are suitable or intended to become suitable for potable water supplies (Colorado Department of Public Health and Environment Water Quality Control Commission, 2011).

The CWQCC's 2010 Integrated Water Quality Monitoring and Assessment Report provides the water quality and attainment status for all waters in the state of Colorado (CWQCC, 2010). The commission determined that sufficient information exists to conclude that all uses are fully supported and water quality standards are attained on national forest lands in the Gunnison basin.

### 3.7.2. Direct and Indirect Effects, Watershed Resources – Alternatives 1 and 2

Waters sourced from forested watersheds is typically higher in water quality than runoff water from areas where there are other land use activities and other vegetative communities. The forest vegetation treatments proposed in both action alternatives, including fuels treatments, should have minimal adverse effects on water quality provided they are planned and implemented according to best management practices. The proposed fuels treatments and forest management activities can help deter high severity wildfires that pose the most significant threat to water quality from public lands (McDonald and Stednick, 2003).

Hydrologically, new road construction has the greatest potential to impair water quality in streams coming off of Nation Forest System lands. Roads potentially alter both the processes by which runoff is produced and the rate that water reaches natural stream drainage networks. This hydrologic alteration is mainly due to a decrease in infiltration. Reduced infiltration can cause overland flow, rarely seen in semi-arid snowmelt dominated watersheds, such as those in the project planning area. The soils in this area have natural infiltration rates that normally exceed the rate at which precipitation can be applied (Hewlett, 1982). The decreased infiltration rate of roads leads to Hortonian infiltration-excess overland flow. Hortonian flow is rarely observed in uncompacted soils in landscapes such as the Cochetopa Hills. Along with possibly increasing overland flows, roads effectively increase a watershed drainage density network when they are designed as a cut and fill road with an inside ditch. This type of road, which is common in the project area, can intercept water that normally flows down a hillslope below the soil surface. The intercepted water is then more rapidly delivered as surface runoff to the watersheds streams or culverts that concentrate water flow and can accelerate gully formation (Jones and others, 1999). The objective of most watershed best management practices is to mitigate the potential impacts of roads and vegetation treatments by reducing the length of concentrated run of runoff from roads and eliminate or reduce direct delivery of sediments and nutrients to streams. Road maintenance and augmentation practices associated with vegetation treatment activities should be designed to disconnect the runoff drainage of the roads and activity areas from the natural drainage network according to the Watershed Conservation Practices (WCP) Handbook (USFS, 2006).

The existing road system accessing the project area is well developed. There are approximately 225 miles of existing road (Table 31) and neither of the action alternatives proposes the construction of many miles of new road. Table 31 summarizes the amount of new road and road realignment proposed for each action alternative in each watershed.

Table 31. Watershed Road Density of Action Alternatives.

Road Density by Watershed and Action Alternative							
Name	Total mi <sup>2</sup>	Existing		Alt 1		Alt 2	
		Roads mi	Road Dens mi/mi <sup>2</sup>	New Roads mi	Δ Road Dens mi/mi <sup>2</sup>	New Roads mi	Δ Road Dens mi/mi <sup>2</sup>
Archuleta Creek	59	90.9	1.55	2.3	0.04	0	0.00
West Pass Creek	50	109.5	2.20	2.4	0.05	1.4	0.03
Headwaters Razor Creek	39	25	0.65	0	0.00	0	0.00

Alternative 1 proposes construction or relocation of 4.7 miles of road. In this alternative 2.3 miles of road are proposed in Archuleta Creek and 2.4 miles of road are proposed in West Pass Creek.

Alternative 2 proposes 1.4 miles of road to be constructed or relocated, all of which are in West Pass Creek. Road density is a common metric used to assess the potential impact of a road system to the hydrologic function of a watershed. Road density is reported in miles of road per square mile of watershed. Road densities are currently between 1-2.4 mi/mi<sup>2</sup> making them in a functioning at risk condition for Archuleta and West Pass Creeks based on the National Watershed Condition Classification protocol (Potyondy and Geier, 2010). The national protocol describes functioning at risk watersheds as having a moderate probability that the hydrologic regime is substantially altered. The Headwaters of Razor Creek are in properly functioning condition according to that protocol with a density less than the 1mi/mi<sup>2</sup> threshold. This watershed is considered by the protocol to have a hydrologic regime that is substantially intact and unaltered. Neither of the proposed increases in road density over existing conditions of either alternative will increase road densities to a level that is expected to change the functioning condition of either Archuleta Creek or West Pass Creek under the national protocol. Neither action alternative proposes change to the road density in the Headwaters Razor Creek drainage thereby maintaining its properly functioning condition rating. Increases in road density by alternative are presented in Table 31 as “Δ Road Density.” Changes in road density for the proposals ranges from an increase of no increase to a maximum increase of 0.05 mi/mi<sup>2</sup> in West Pass Creek for Alternative 1.

Field observations of the current road system support their classifications based on the National Watershed Classification protocol. The project area was observed to currently have a road system that for the most part appears to see little use during most of the year. The road system does not appear to be notably altering the hydrologic function of the associated watersheds. The roads were generally observed to be disconnected from the natural drainage network of the project area. Accelerated transport of sediment from roads was not for the most part noted during field inspection of the proposed management units (Stratton, 2010).

### **Water Quantity and Hydrologic Processes**

The annual water balance for the watersheds within the project planning area is driven by both snowmelt and late summer rains (Figure 10). Vegetation management, as proposed in both action alternatives, could possibly alter the water balance components in the subalpine climatic setting by decreasing evaporation, transpiration, and interception losses resulting in increased watershed runoff. This manipulation of the water balance is most notable at the subdrainage scale to the even smaller hillslope scale. The effects of 10% total basal area removal of timber on watershed yield at the 6<sup>th</sup> code HUC scale is not typically measurable (Troendle and King, 2003). Paired watershed studies in Colorado have shown that at least 15% of a watershed’s canopy cover must be removed to significantly impact a watershed’s total water yield (McDonald and Stednick, 2003). The variation of watershed yield as a function of canopy removal is most related to redistribution of snow accumulation within the larger scale watershed. About a 40% increase in annual watershed yield at the hillslope scale can be attributed to variation in snow water equivalent accumulated as a result of changes in canopy cover (Troendelle and King, 1985). Snow may accumulate at a greater rate within timber units as a result of canopy openings that change snow drift accumulation but at the normal analysis scale of the the 6<sup>th</sup> code HUC

these greater accumulation rates balance out to minimal net gains in available runoff water. Table 32 summarizes the total canopy removal proposed for each alternative for all vegetation types as well as for only the subalpine types of lodgepole pine and spruce fir stands. These numbers were arrived at by analyzing the amount of proposed canopy removal and the current estimates of watershed canopy cover as provided by the best available data on forest vegetation for the GMUG. Figure 11 shows the spatial distribution and intensity of proposed canopy removal for each watershed with a background of the current canopy cover. Archuleta Creek has the most significant amount of planned canopy removal of about 10% in both alternatives while upper Razor Creek has the least total canopy removal proposed of 2% of the total canopy cover (almost 5% of the total subalpine canopy). Neither alternative proposes removal of more than 15% of canopy for any given watershed suggesting that alteration of water balance components will not be significant enough to measurably change overall annual watershed yield.

Table 32. Proportion of Proposed Canopy Removal for both Action Alternatives by Treatment Type.

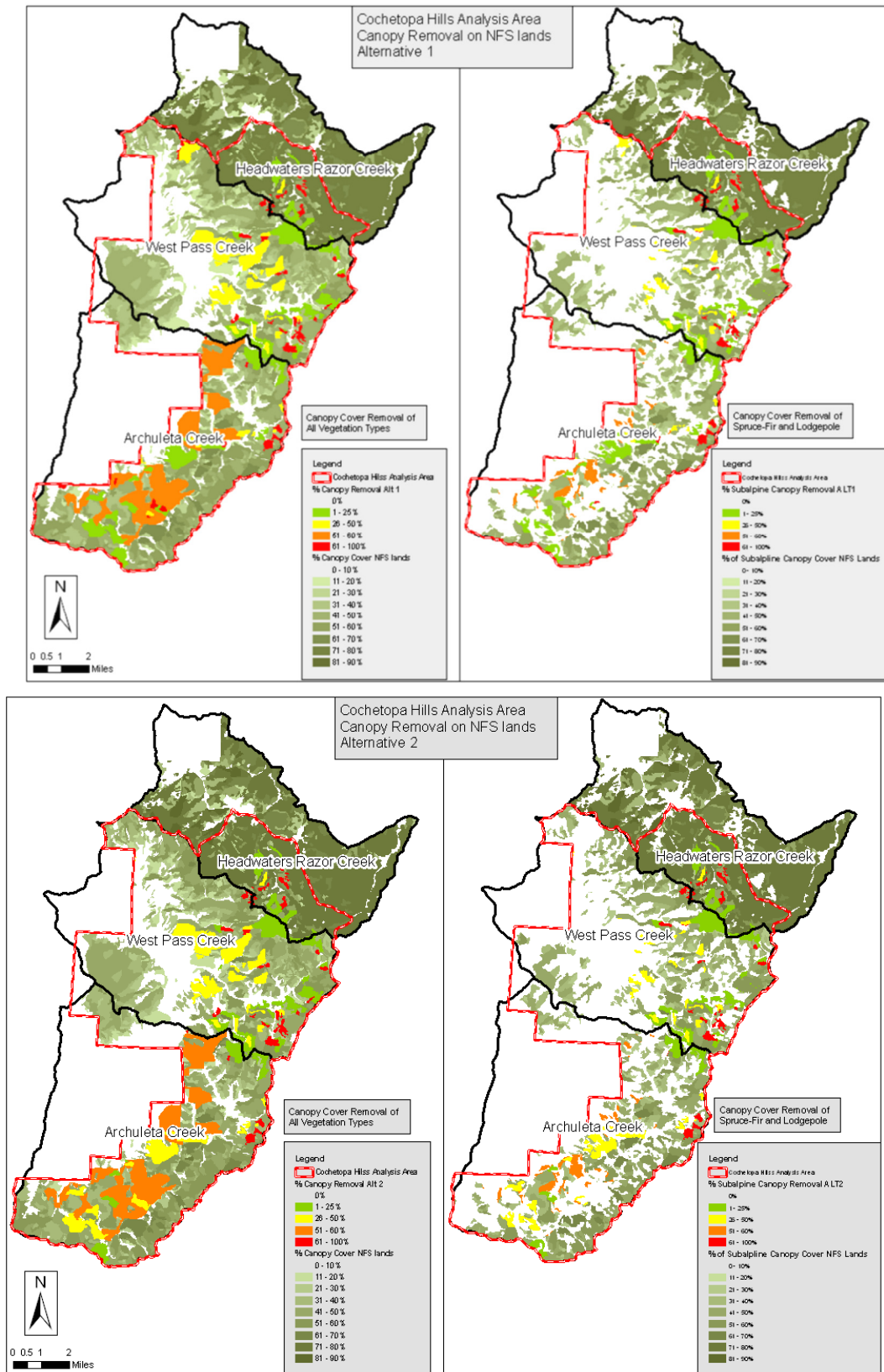
**Canopy Removal by Watershed**

	<b>Alt 1</b>			<b>Alt 2</b>		
<b>Watershed</b>	<b>burn</b>	<b>mech</b>	<b>total</b>	<b>burn</b>	<b>mech</b>	<b>total</b>
Archuleta Ck	6.0%	4.1%	10.1%	8.8%	1.6%	10.4%
West Pass Ck	2.8%	5.9%	8.8%	2.8%	5.2%	8.0%
Upper Razor Ck	0.0%	1.5%	1.5%	0.0%	1.5%	1.5%

**Subalpine Canopy Removal by Watershed**

	<b>Alt 1</b>			<b>Alt 2</b>		
<b>Watershed</b>	<b>burn</b>	<b>mech</b>	<b>total</b>	<b>burn</b>	<b>mech</b>	<b>total</b>
Archuleta Ck	3.7%	5.6%	9.4%	7.8%	2.6%	10.3%
West Pass Ck	0.3%	3.1%	3.4%	0.3%	2.9%	3.2%
Upper Razor Ck	0.0%	4.7%	4.7%	0.0%	4.7%	4.7%

Figure 11. Current canopy cover and proposed canopy removal



Stability in watershed flows should maintain geomorphic stability of the streams channel characteristics. Consistency in the annual stream flow tends to maintain the inherent natural geomorphic stability of the stream channel. Field observations by Forest Service personnel (Stratton and Almy, 2009) of stream channel stability found that previous timber management activities had not altered the stream channel morphology.

Deadman Creek above its confluence with Razor Creek was characterized, through field inspection, as a stable A type channel (Rosgen, 1994). The channel characteristics included very stable stream banks, not actively down-cutting with a very low (2.3) width-to-depth ratio. High width to depth ratios (>12) for this type of channel would suggest the channel is adjusting to increased water flows by widening its bank full width while maintaining a shallow overall depth. This watershed has a history of lodgepole pine removal from previous timber management activities, but the existing stable stream channel conditions at the outlet of the watershed suggest that the watersheds in the project area are capable of sustaining desired channel morphology with the timber management activities proposed in both action alternatives.

Razor Creek was observed to be responding similarly well to active timber management. It was classified as a stable E type channel (Rosgen, 1994) with an average width-to-depth ratio of 3.7, well vegetated stable banks, and a healthily meandering stream channel. These observations indicate that the stream system is stable and functioning properly. Extensive baseline habitat data were collected on a reach of Razor Creek in 2009 to support monitoring of the streams response to vegetation treatments using the R1/R4 Habitat Inventory procedures (Overton and others, 1997).

Ephemeral and intermittent drainages dominate the landscape of Cochetopa Hills project area as a result of the areas climatic regime and predominantly well-drained soils. These channels carry water annually as a result of snowmelt and precipitation events but do not have a consistent flow because they lack groundwater supplied baseflow. Intermittent channels are characterized by a topographical convergence of annual runoff that results from the snowmelt during the spring. Ephemeral drainages are defined as channels that carry water as a result of direct response to precipitation in the immediate area of the drainage. Vegetation treatment activities can occur in and around both intermittent and ephemeral drainages but temporary roads and log skidding activities should be prohibited from traveling up and down the topographic convergences that normally route water through these areas.

### **Riparian Areas and Wetlands**

Healthy riparian and wetland areas are critical to maintaining properly functioning watersheds. Riparian communities contribute positively to water quality by, among other functions: stabilizing stream channels, providing collection zones for sediment, and providing shading that helps maintain stream temperatures (Debano and Schmidt, 1990). Based on the best available riparian delineation data for the project area there are currently approximately 2,000 acres of riparian in the project area (Table 33). The validity of the riparian delineation extents were verified during hydrologic field inspection work conducted in the project area (Stratton, 2010). The largest proportion of riparian zones that could be affected by the proposed vegetation management actions is in Archuleta Creek where 24.4% of the total riparian area is within the proposed treatment units for both action alternatives. The majority of these

activities are non-mechanical prescribed fire treatments. A total of only 4.2% of riparian in the Archuleta Creek watershed lies within mechanical treatment units of action alternative 1. 1.4% of the riparian zones of the watershed in alternative 2 are within mechanical treatment units. Spatial distribution of riparian areas and proposed actions are shown in Figures 12 and 13.

Table 33. Riparian Areas within Units by Action Alternatives and Watershed.

Riparian Areas by Watershed and action alternative

Watershed	Riparian (acres)	Alt 1			Alt 2		
		burn (acres)	mech (acres)	total (acres)	burn (acres)	mech (acres)	total (acres)
Archuleta Ck	553	127	8	135	133	2	135
West Pass Ck	581	9	16	25	9	6	14
Upper Razor Ck	808	0.0	0.4	0.4	0	0	0

% of Riparian Areas within units by action alternative

Watershed	Riparian (acres)	Alt 1			Alt 2		
		burn	mech	total	burn	mech	total
Archuleta Ck	553	22.9%	1.4%	24.4%	24.0%	0.4%	24.4%
West Pass Ck	25	1.5%	2.7%	4.2%	1.5%	1.0%	2.5%
Upper Razor Ck	808	0.0%	0.04%	0.04%	0.0%	0.04%	0.04%

Adhering to prescribed best management practices as described by the regionally adopted Watershed Conservation Practices Handbook (US Forest Service, 2006) will assure that riparian wetland and riparian features maintain their function on the landscape. The GMUG Forest Plan (USFS, 1991) directs management of riparian vegetation to maintain fish and wildlife populations, stabilize stream channels, and to protect soil and water resources. While timber management is not prohibited in riparian areas it is to be done with care and should only occur with an objective of improving water quality, habitat, or long term forest health.

Figure 12. Riparian Areas in the Cochetopa Hills analysis area action Alternative 1

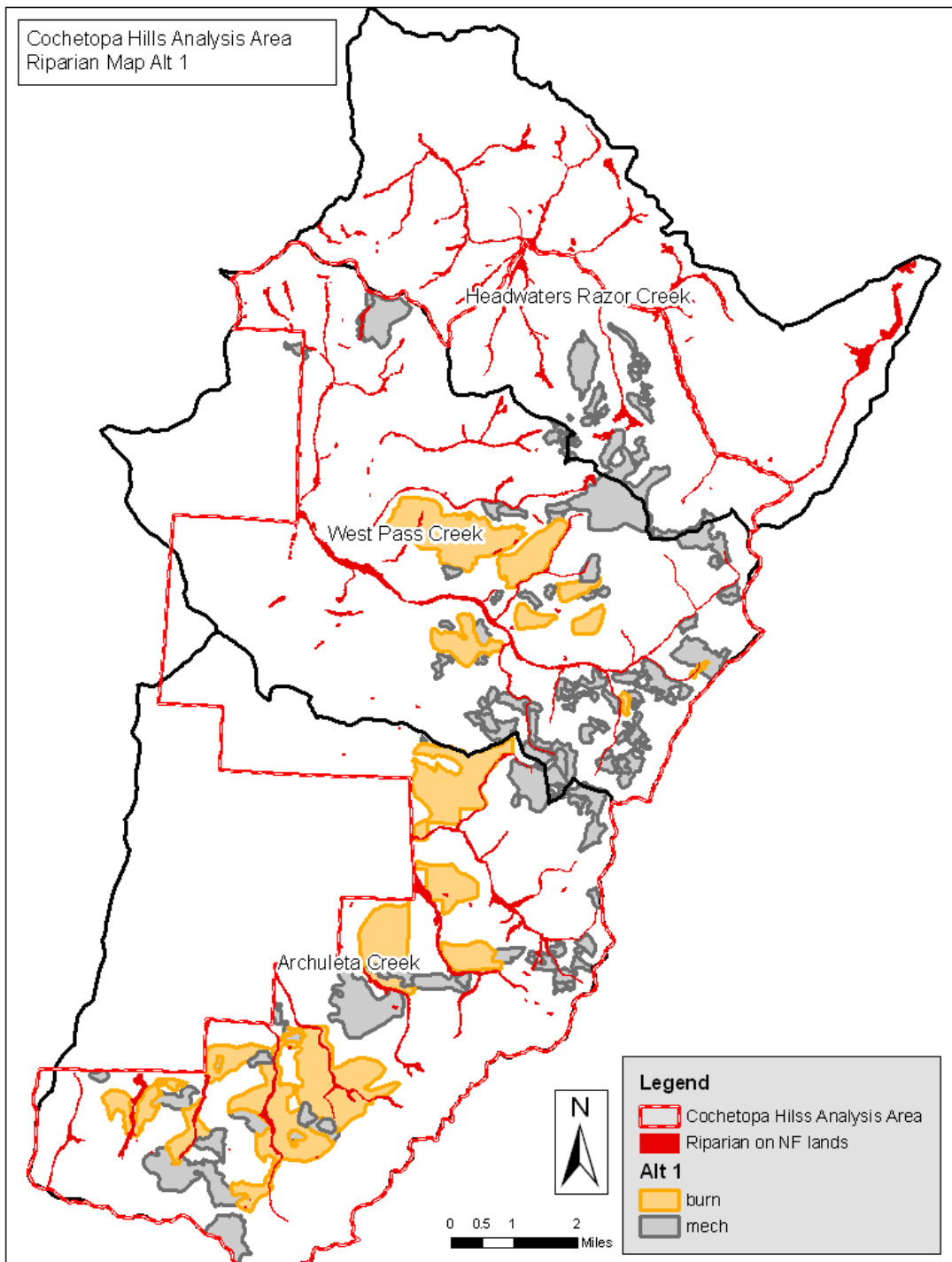
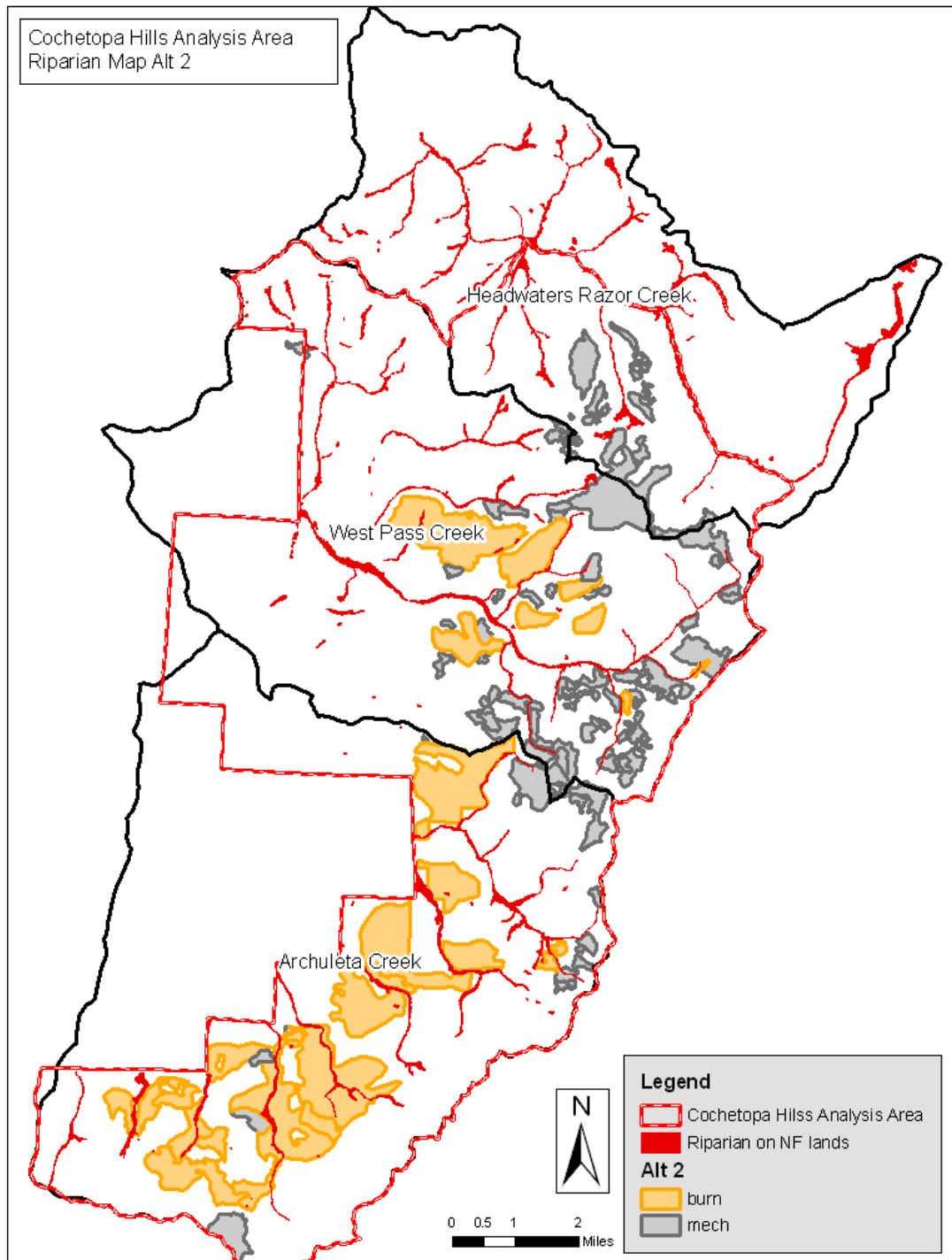




Figure 13. Riparian Areas in the Cochetopa Hills analysis area action Alternative 2.



Fens are a unique form of wetland that accumulate peat and are of particular interest and importance due to their relative scarcity on GMUG lands. Field survey work was conducted to locate fens within the project area in September 2010, which discovered two fens. An extensive forest wide survey of fens across the entire GMUG also located a fen in the project area. The location of one wetland that is potentially a fen was noted in Monchego Park. This possible fen was down gradient of an existing road that will be used for the proposed vegetation management activities and upslope of a small stock pond. The wetland is located within a unit that is proposed to be treated with prescribed fire in both action alternatives. The fen that was verified during Forest-wide inventory efforts is located in a mechanical treatment unit in Wolverine Gulch. The third fen is located along an intermittent tributary to Samora Creek. Fens are most greatly threatened by forest management through the hydrologic alteration of their groundwater source. Since no new temporary or permanent roads will be in close proximity to any of the fens it is unlikely that the proposed management will adversely affect the groundwater hydrology or integrity of the wetlands. These fens and any others that might be found within the project analysis area should be managed to provide a 300-foot minimal disturbance zone from the edge of the wetlands.

Isolated wetlands and springs have been identified within proposed action management units. If these are adequately marked and protected there will be no direct effects. Other than transportation system channel crossings there will be no operations within the water influence zone (WIZ) areas associated with wetlands, and either perennial or intermittent stream channels. This is in accordance with the regional WCP manual (USFS, 2006).

### *3.7.3. Cumulative Effects, Watershed Resources – Alternatives 1 and 2*

Activities that may have a cumulative effect on the three sub-watersheds in the area include new road construction and canopy removal. New road construction has the potential to impair water quality by reducing infiltration and subsequently increasing overland flows. Cut and fill roads with an inside ditch intercept water that would normally infiltrate soils, increase runoff and water flow, and subsequently create gullies. Following best management practices should mitigate road impacts. The construction of new roads in the project area is minimal and densities will not increase to a level that will alter the functioning condition of the three creeks.

Canopy removal has the potential to affect watershed yield and alter hydrologic processes. In the subalpine climatic setting, decreased evaporation, transpiration, and interception may occur, resulting in increased runoff. Snow may accumulate at a greater rate where the canopy has been removed but at the normal analysis scale of the 6<sup>th</sup> code HUC these greater accumulation rates balance out to minimal net gains in runoff water. Archuleta Creek has the most significant amount of planned canopy removal (about 10% under either alternative). However, since less than 15% of canopy removal is planned, no significant change in annual watershed yield is expected.

Precipitation and snowmelt create ephemeral and intermittent channels throughout the project area. Temporary roads and log skidding activities should be prohibited from traveling up and down the topographic convergences that normally route water through these areas.

Approximately 2,000 acres of riparian area have been identified within the project area. In Archuleta Creek, 24.4% of the total riparian area is within the proposed treatment area. The majority of these activities are non-mechanical prescribed fire treatments. Timber management in riparian areas must carefully follow best management practices to maintain properly functioning watersheds.

High severity wildfires post the greatest threat to water quality in the Cochetopa Hills project area. The proposed vegetation treatments will help to reduce the likelihood of high severity wildfire and improve forest health. By carefully following best management practices, adverse effects on water quality should be minimal.

### 3.8. Wildlife

Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3). Under the Endangered Species Act (ESA), the effects analysis report is called a biological assessment (BA) and must be prepared for federal actions that are “major construction activities” to evaluate the potential effects of the proposal on listed or proposed species and critical habitats. The contents of the BA are at the discretion of the federal agency, and will depend on the nature of the federal action (50 CFR 402.12(f)). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the NEPA process ensures that TEPS species receive full consideration in the decision-making process. A separate biological evaluation was prepared to address Forest Service sensitive species and Management Indicator Species (MIS). These documents are available in the project record.

#### 3.8.1. *Existing Conditions – Wildlife*

The planning area is composed of seven major forested cover types and a large component of open parks and meadows (sagebrush, potentilla, grass/forbs, riparian). The Lodgepole pine cover type makes up the majority of the forested area (42%) within the planning unit, and is located mainly in the Razor Creek watershed at the north end of the project area (FSVeg, 2011). The next most prevalent cover type is the cool moist mixed conifer type (16%). The remaining forest cover types include aspen (14%), spruce-fir (9%), bristlecone pine (8%), warm dry mixed conifer (6%), ponderosa pine (5%) - listed in order of predominance within the landscape.

**Lodgepole pine** –Lodgepole pine (*Pinus contorta*) stands in the Cochetopa Hill planning area are mainly composed of pure stands that are not succeeded by another species. The majority of this habitat type is located in the northern portion of the Cochetopa Hills planning area at mid to high elevations. It also covers the northern portion of the Cochetopa Lynx Analysis Units (LAU) and the majority of the Needle

Razor LAU. Most of this area has had timber harvesting operations in the past, and there is a modern road system for the transport of wood products to these stands.

There are several wildlife species that occur in this habitat type including northern goshawks, which are known to utilize these areas as nesting habitat, deer and elk which use some of the lodgepole stands for thermal and security cover, and several woodpecker species. In dense, regenerating lodgepole pine stands resulting from past clearcuts, snowshoe hares have been documented incidentally from visual observation of tracks in snow.

**Aspen** – Aspen stands in the Cochetopa Hills planning area are those in which conifers are unlikely to succeed them. These stands are mature and are near the end of the physiological life span. Due to heavy browse pressure on aspen sprouts by wildlife species as well as the impacts of Sudden Aspen Decline in mature stands, there is little aspen regeneration. Aspen forests provide habitat for a variety of mammal and birds species including but not limited to deer, elk, small mammals (e.g. chipmunks, gophers, squirrels and voles), northern flicker, black-capped chickadee, house wren, warbling vireo, yellow-rumped warbler, western wood-pewee, western blue bird, violet green swallow, tree swallow, dusky grouse and dark-eyed junco.

**Spruce-fir** - Spruce-fir is scattered in the Cochetopa Hills planning area with patches located along the southern and eastern boundary in the Cochetopa LAU and in patches in the northern portion in the Needle Razor LAU (Figure 14). This stand type represents the most productive sites in higher elevations. Most of these stands have been subject to timber harvesting operations in the past.

Spruce-fir stands provide high quality denning, foraging and dispersal habitat for Canada Lynx. Treatments in the planning area include opportunities to create or improve dense horizontal cover for foraging habitat, and to promote/maintain multi-storied, mature stand structures for denning and dispersal habitat within non spruce-fir conifer stands since the proposed action excludes any treatments within the spruce-fir cover type.

**Bristlecone pine** - Bristlecone pine forest types are found on low quality sites that generally do not support other conifer species. These stands have a higher density than historic conditions, but are relatively healthy. They contribute to habitat diversity in the Cochetopa Hills planning area are important to maintain. Bristlecone pine stands in the planning area currently have a higher density than historic conditions indicate, yet these stands remain relatively healthy.

**Ponderosa pine** – Ponderosa pine stands can be found at the lower elevations in the Cochetopa planning area. These stands have historically experienced a low severity, frequent fire disturbance regime and have become denser due to fire suppression activities. Due to these conditions, the establishment and growth of shade tolerant and fire intolerant species such as blue spruce are present in the understory. Many of these stands have been thinned and as a result are within historical stand conditions. Like bristlecone stands in the planning area, ponderosa stands contribute to habitat diversity and are important to maintain.

**Action Area, Including Summary of Current Conditions, Developments and Human Uses**

The action area is composed of the geographic area that is potentially affected by the proposed action, including direct, indirect and interdependent or interrelated activities. The action area includes all areas potentially affected by visual and audible disturbance created by the project activities, as well as potential terrestrial and aquatic habitat impacts. The action area serves to establish baseline conditions from which to evaluate potential effects from the project. The extent of the action area may also be species-specific (i.e. lynx).

The Lynx Conservation Assessment and Strategy (Ruediger 2000) indicates that project planning should evaluate the effects to lynx habitat within designated Lynx Analysis Units (LAUs) that are generally  $\geq 25,000$  acres in the southern Rocky Mountain Geographic Area. LAUs are intended to provide the smallest scale at which the effects of management actions on lynx habitat are quantitatively evaluated. LAUs do not represent actual lynx home ranges, but their scale should approximate the size of an area used by an individual female lynx.

For the proposed project, the Cochetopa and Needle-Razor LAUs on the GMUG within Saguache County will be considered the action area for the analysis of effects on lynx (Figure 14). All direct and indirect effects of the proposed action are expected to be contained within this 103,709-acre action area. Other terrestrial species were analyzed at the scale of the Cochetopa Hills project planning area which is 61,252 acres.

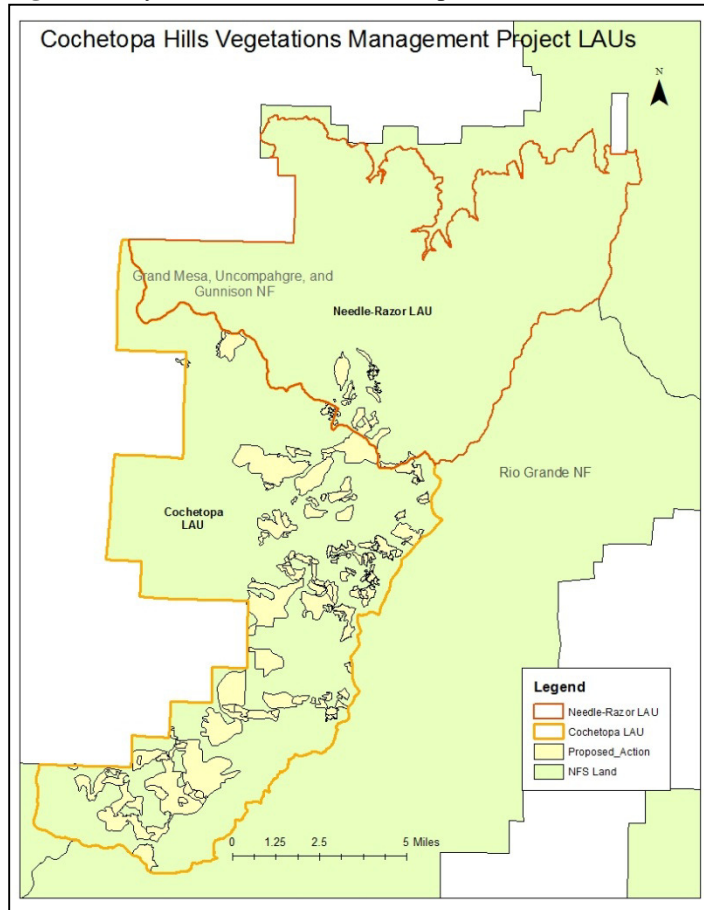
The action area for lynx has approximately 43,335 acres of lynx habitat currently mapped as suitable. The proposed treatment units include approximately 5,164 acres of currently suitable lynx habitat within the Cochetopa and Needle-Razor LAUs. A portion of the project area also overlaps the North Pass-Cochetopa Hills lynx linkage area along the northeast boundary of the project planning area. This linkage area connects the Gunnison Ranger District of the GMUG with the Saguache Ranger District of the Rio Grande National Forest. Linkage areas may consist of forest stringers that connect large forested areas, or mountain passes that connect subalpine forests on opposite sides of a mountain range (Ruediger et al. 2000). Lynx linkage areas are key movement corridors where human activities may also impact lynx dispersal (including highway use, larger areas of vegetation treatments, etc.).

Human uses within the action area include hunting, fishing, dispersed camping, OHV riding, driving for pleasure/sight-seeing, wildlife viewing, hiking, horseback riding, picnicking, firewood gathering, snow shoeing, cross-country skiing, snowmobiling, use of all-terrain vehicles on roads, public and private land livestock grazing, and vegetation management. Existing developments include developed campgrounds, picnic or day use areas, restrooms, trailheads, historic buildings, signs, roads, utility lines and modern houses (developed on private land).

The 103,709-acre action area comprises two LAUs, including Cochetopa and Needle-Razor on National Forest land (Figure 14). The action area has approximately 42,908 acres of lynx habitat currently mapped as suitable, and 427 acres currently mapped as unsuitable. Unsuitable habitat is due to past vegetation management activities including prescribed burning, fuels reduction, timber harvest, and natural disturbances (i.e., spruce bark beetles). After lynx were listed as a threatened species in 2000, the Forest

Service conducted a batch consultation with U.S. Fish and Wildlife Service on all ongoing activities. The effect determination on lynx was *May Affect, Not Likely to Adversely Affect*.

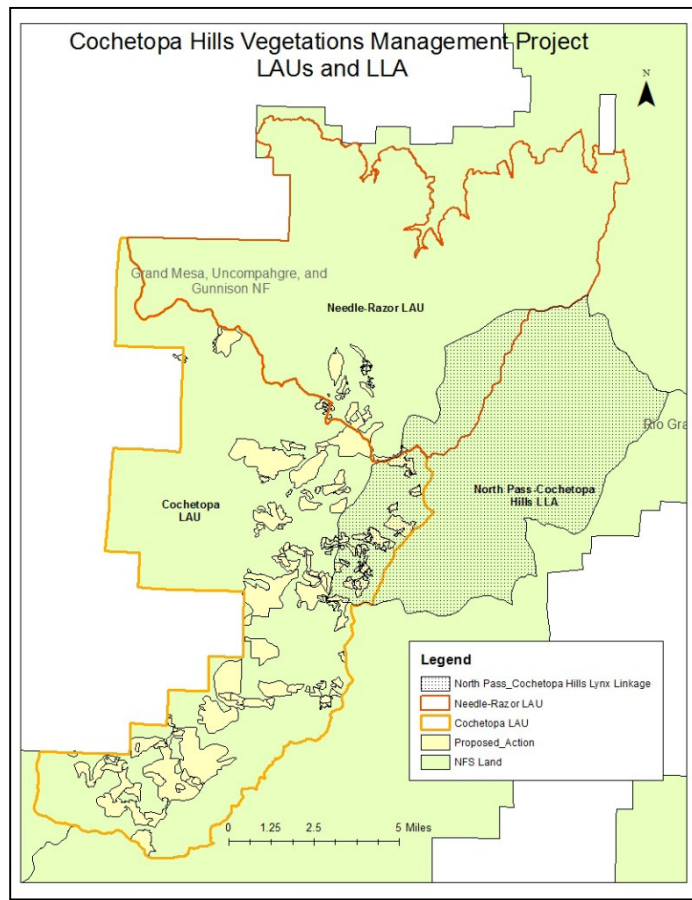
**Figure 14.** Lynx Action Area – Cochetopa LAU and Needle-Razor LAU



### Lynx Linkage Area

Both LAUs that make up the lynx action area include a portion of the North Pass-Cochetopa Hills Lynx Linkage Area (LLA) (Figure 15). This 33,211-acre LLA is located on the eastern portions of both LAUs. Approximately 9,135 acres of the LLA occur on the GMUG National Forest (28% of the LLA; the remaining 24,076 acres [72%] occurs on the Rio Grande National Forest).

For the GMUG portion of the LLA, all of the acres are on National Forest System lands. Suitable lynx habitat totals 6,241 acres on the GMUG portion and 6,959 on the Rio Grande portion. The total amount of suitable habitat for the LLA is 13,603 or 41% of the LLA; unsuitable habitat totals 403 acres; and the remaining 19,608 acres is non-habitat. Approximately 6.7 miles of State Highway 114 are in the LLA on the GMUG and Rio Grande National Forest.

**Figure 15.** Lynx Action Area – Cochetopa & Needle-Razor LAUs and North Pass-Cochetopa Hills LLA

### 3.8.2. Direct and Indirect Effects, Wildlife – Alternatives 1 and 2

#### Threatened, Endangered, Proposed, Forest Service Sensitive, and Management Indicator Species

This section discloses the likely effects of the alternatives to federally listed species, Forest Service sensitive species, management indicator species (MIS), and other species or habitats pertinent to this project. A summary of the analysis for wildlife species is presented below. The complete Cochetopa Hills Vegetation Project Wildlife Biological Assessment is incorporated by reference and is part of the project record available at the Gunnison Ranger District office.

A total of 40 terrestrial species were evaluated to determine if the species or their habitat is present within the project area: 9 federally threatened, endangered or proposed species; 27 Forest Service sensitive species; and 5 management indicator species (including 2 MIS species that also are Forest Service sensitive and are not duplicated in the total). For a complete list of all species considered, refer to the Wildlife Specialist Report. Fifteen species, as listed in Table 34, were carried forward in the report for analysis, and the effects of the proposed action and alternatives for each species were addressed.

Table 34. Species Included in the Project Analysis.

Threatened, Endangered, Proposed Species	Management Indicator Species	Sensitive Species			
		Mammals	Birds	Amphibians	Insects
Canada Lynx, North American wolverine	Rocky Mountain elk, Abert's squirrel, American marten, Northern goshawk, Red-naped sapsucker	Hoary bat, American marten, Pygmy shrew, Gunnison's prairie dog	Gunnison Sage-grouse, Northern goshawk, Boreal owl, Olive-sided flycatcher, Flammulated owl	Northern leopard frog	N/A

### Direct and Indirect Effects of Alternatives 1 and 2 for Threatened, Endangered and Proposed Species

A brief discussion of effects for each species follows below. For the full analysis and details, please refer to the Wildlife Specialist Report.

#### **Canada Lynx (*Lynx Canadensis*)**

Through radio-telemetry Colorado Parks and Wildlife researchers have confirmed lynx presence, dispersal and reproduction on the GMUG National Forests and on BLM lands managed by the Gunnison Field Office. From February 4, 1999 through February 1, 2005, 121 individual lynx were located within the GMUG National Forests (Shenk 2005). Colorado Parks and Wildlife monitoring of radio-collared lynx from April 2000 to April 2009 (Shenk 2009) and an assessment of "population-level" habitat use from 1999 – 2010 (Theobald and Shenk 2011) indicates that the proposed project is located outside of lynx low, moderate, and high-use areas. Although population-level use has not been documented, lynx have been documented within the action area and within the project planning area, based on Colorado Parks and Wildlife radio-telemetry monitoring of collared animals (Ivan 2011). Lynx are known to travel through the North Pass linkage zone on both sides of the Continental Divide across Highway 114. The SRLA identifies all lynx habitat for the National Forests in the Southern Rocky Mountains as occupied. Field surveys during the summer and fall of 2012 and field visits in 2009-2010, which included assessments of snowshoe hare habitat by measuring dense horizontal cover, verified the presence of suitable lynx habitat in the LAUs affected by the proposed project.

#### **Canada Lynx - Direct Effects of Proposed Action (Alternative 1)**

Treatment activities will likely result in the temporary displacement of lynx due to the presence of human activity and increased noise generated by treatment activities. Due to the displacement of lynx, it is unlikely treatment activities will result in direct mortality to any individuals. The increase of traffic associated with project activities may result in an increased risk of vehicle-lynx collisions. However,



these types of vehicles would be moving at low speeds and are unlikely to collide with lynx crossing roads. Habitat will be affected by treatment activities including changes in stand structure and composition. Approximately 297 acres of suitable habitat will be changed to a Stand Initiation Structural Stage (SISS) due to clear cuts and the creation of temporary roads in suitable habitat. Clear cut acres are located within aspen, even-aged lodgepole pine and mixed conifer stands. This is equal to approximately 0.8% of available lynx habitat in the Cochetopa and Needle-Razor LAUs. No treatments are proposed in spruce-fir stands due to the spruce bark beetle epidemic that has invaded the planning area.

Noise disturbance will directly affect lynx in the area and will result in the temporary displacement of individuals. They will likely return to these areas once treatment activities cease. Based on anecdotal information, individuals would most likely avoid disturbance in the immediate area but otherwise continue to utilize undisturbed portions of the LAUs and linkage area as well as the project area when human activity and logging operations are lacking. Treatment activities may occur at any time of the year, but will occur in different areas during different periods of time. The project will occur over a 10-year period so harvest operations will be staggered. Currently, based on information in a report compiled by Theobald and Shenk (2011), the area is not known to support population-level utilization by lynx; therefore the project has a lower likelihood of impacting resident lynx.

If any resident lynx with established home ranges in the affected LAUs are present, lynx kittens may be present nearby or in den sites while treatment activities are occurring. Kittens are more vulnerable when they are very young and could potentially be injured or killed by logging equipment and activities. Female lynx are known to move kittens from the natal den site to a maternal den site, and may move kittens between several different maternal dens, especially if disturbed. Maternal lynx may expend energy moving kittens to avoid disturbances rather than devoting that time to hunting and maternal care of young. However, much of the salvage activity will occur during the summer, fall, and winter months outside of the lynx denning period (April – late June) due to wet soil conditions. Additionally, the planning area lacks habitat characteristics documented as den sites by Colorado Parks and Wildlife researchers from radio-telemetry tracking of collared lynx thus the potential for denning lynx to be present is low.

#### **Indirect Effects to Lynx Habitat, Alternative 1**

The proposed action will change stand structure in treatment units and will affect lynx habitat. Most areas will still be considered suitable habitat, however, the quality of that habitat will be degraded until stands regenerate. Clear cut treatment units are in stands composed of tree species that depend on a degree of mortality in order for regeneration to occur (i.e. aspen). Although clear cut treatments will result in a conversion to unsuitable habitat, the stands in which this will occur are single storied, even-age stands that are not high quality lynx habitat. In addition, aspen will regenerate at a faster rate than stands that are composed of conifer species.

The proposed action would reduce habitat attributes that are preferred by lynx and their primary prey species (*i.e.* snags, down woody debris, and Dense Horizontal Cover) in areas where treatments occur. However, wildlife design criteria will mitigate these effects. Wildlife design criteria included in the

proposed action includes the retention of snags (300/100 acres) and coarse woody debris (10-20 tons/acre) across treatment units. This will decrease these elements compared to existing conditions, however it will maintain habitat connectivity for lynx. Treatment activities may also result in the incidental loss of understory vegetation and could reduce the quality and quantity of winter foraging habitat for hares. DHC meeting the SRLA VEG S6 standard occurs when vegetation cover at or near snow level is above 35% and has been found by researchers to provide for quality snowshoe hare habitat during the winter. It not only includes live vegetation, but also includes the stems and branches of dead trees. While the proposed project could reduce the amount of snowshoe hare habitat in treatment units (especially clear cut units), stands meeting the standard for DHC are excluded from the project and portions of stands in treatment units with advanced regeneration will be avoided to the extent practicable during unit layout. Prescribe fire treatments will occur within Douglas fir-Ponderosa pine stands, aspen stands and in open grass/shrub areas. Treatments in forested stands are intended to reduce ground and surface fuels using a low intensity surface or promote sprouting in aspen stands. These treatments may also reduce the amount of DHC in the forested stands, but only for the short term. No prescribe fire treatments will occur in spruce-fir stands or in conifer stands meeting the DHC standard. Another impact to DHC will be the creation of temporary roads for project implementation. These roads will also reduce the amount of DHC in the action area. All of these activities will convert approximately 297 acres of habitat to a Stand Initiation Structural Stage or unsuitable habitat through incidental loss. All incidental loss of DHC from skid trails, landings, temporary roads, and treatment activities will occur in single-storied stands that contain a scattered understory.

Treatment activities will cause snowshoe hares to displace into adjacent areas that still provide habitat. Subsequently, foraging opportunities for lynx will also be reduced within and around treatment areas. Changes in DHC levels, canopy cover and coarse woody debris will decrease lynx winter foraging and denning opportunities in treatment areas. However, treatment activities are intended to improve stand conditions in the long term which will also improve habitat conditions for lynx and hares. Currently, stands in the project area are overstocked with trees, at risk to stand replacing high severity fire, lack of age class diversity or are not able to regenerate. Units that don't include clear cut activities will continue to provide DHC and levels are anticipated to increase within 10 to 20 years. All of these units will change in terms of stand structure, but they will all have some degree of understory which will allow these units to increase DHC levels in the short term (10 – 20 years). Although the proposed action may result in effects to lynx and their prey, foraging and denning opportunities will improve as stands regenerate.

**Lynx Linkage Area** - The proposed action would treat 1,107 acres of the North Pass-Cochetopa Hills Lynx Linkage Area (LLA). Treatments include burning in aspen stands, group selection, thinning, clear cut, overstory removal, and pole clear cut all along the western portion of the linkage area near State Highway 114. These activities would impact 3% of the linkage, but project design criteria are included to maintain habitat connectivity and to meet the intent of the SRLA (Objective ALL O1-maintain habitat connectivity). Linkage areas were established to facilitate lynx dispersal and habitat connectivity between and within LAUs, across highways, and between National Forest Units. Although treatment units do not occur throughout the entire linkage area, it is important to meet the intent of the SRLA and

be consistent with Objective ALL-O1 by applying applicable design criteria during project implementation. As such, Gunnison Ranger District wildlife staff will provide direction and guidance to crews on the ground in the design and layout of harvest units and snag retention areas for maintenance of habitat connectivity.

**Roads** – Under the proposed action, road miles and density would be temporarily increased within one LAU and one LLA for a period up to 10 years due to temporary roads constructed to implement treatment activities (Table 35).

Table 35. Comparison of Road Baseline Conditions to the Influence of the Proposed Action

LAU/LLA	Existing Rds (mi)	Existing Rd Density (mi/mi <sup>2</sup> )	Proposed Temp. Rds (mi)	Updated Rds (mi)	Updated Rd Density from Temp. Rds (mi/mi <sup>2</sup> )
Cochetopa	114.1	0.43	3.3	117.4	0.44
Needle Razor	21.8	0.08	0	0	0.08
North Pass-Cochetopa Hills LLA	16.2	0.06	1.4	17.6	0.07

Assuming a 20 foot clearing width, suitable lynx habitat converted to an unsuitable condition from temporary roads totals 8 acres (0.03%) in the Cochetopa LAU, and 3.4 acres (0.02%) in the North Pass-Cochetopa Hills LLA which are also included in the LAU acres. Since the stands are not multi-storied mature conifer forests, acres affected by roads are being tracked under VEG S1 and S2.

Due to slow speeds on Forest roads, the increase in road use as a result of treatment activities is unlikely to increase the chances of collisions with lynx. Traffic volumes on roads have the potential to negatively influence wildlife movements when volumes reach 2,000 vehicles per day (VPD). Although the number of VPD on roads will increase slightly, traffic volumes will stay well-below this threshold. The busiest road in the action area, Highway 114, currently has a daily average of 110 VPD based on CDOT data.

**Snow Compaction** – Snow compaction may allow coyotes opportunities to compete with lynx for prey species as they are more efficient at moving through these areas than lynx (Bunnell et al. 2006). However, a study in Montana (Kolbe et al. 2007) has shown that this is not necessarily the case, but the possibility still exists. Table 36 is a summary of the changes in snow compaction from the proposed action compared to environmental baseline conditions.

Table 36. Comparison of Environmental Baseline Snow Compaction Conditions to the Influence of the Proposed Action.

LAU/LLA	Baseline Snow Compaction Acres	Baseline % of LAU/LLA	Updated Snow Compaction Acres	Updated % of LAU/LLA
Cochetopa	36.5	0.07	13.2	0.03
Needle Razor	0	0	0	0
North Pass-Cochetopa Hills LLA	0	0.04	89.5	0.25

This analysis quantifies snow compaction primarily associated with roads and known snowmobile play areas. It is assumed routes used for treatment activities in the winter will have an average width of 20 feet of compaction. Snow compaction will also occur within treatment units associated with skid trails and the removal of trees. All additional snow compaction will be temporary, lasting only through project implementation and it will occur in different areas during different time periods. Thus, the estimates shown in Table 36 is the total amount of snow compaction associated with roads anticipated throughout the life of the project.

#### **Direct and Indirect Effects of Habitat Change and Use of SRLA Exemptions and Exceptions**

Under the proposed action, acres excluded from harvest are areas with the highest quality snowshoe hare/lynx habitat (DHC  $\geq$  35%), denning habitat (lynx, marten, and snowshoe hare) and areas providing security and travel cover for elk, lynx, and pine marten. Additionally, areas not supporting a road system were excluded from harvest consideration due to costs and logistics and potential environmental effects of road construction. Excluding these areas from harvest consideration reduces the overall miles of temporary roads needed, which would maintain habitat effectiveness on these acres.

The proposed action was designed to minimize effects to lynx habitat and better protect the integrity of potential wildlife corridors, especially for lynx, across Highway 114 (North Pass-Cochetopa Lynx Linkage Zone). The proposed action would result in more of a mosaic of habitat types and structural diversity across the landscape than Alternative 2. Tables 37 and 38 provide summary statistics for lynx habitat within the affected LAUs.

Table 37. Expected Change to Cochetopa LAU Baseline from the Proposed Action and use of the Exceptions under the SRLA. Existing baseline source is the December 2010 Revised Lynx Habitat Model

Cochetopa LAU Habitat Description	Existing Baseline - Acres (%)	Proposed Action – Acres (%)	Acres and total percent change (baseline + proposed action)
Total LAU Acres	55,173 (100)	55,173 (100%)	55,173 (0%)
Non-habitat acres	29,742 (53.9)	29,742 (53.9)	29,742 (0%)
Total Acres of Suitable Lynx Habitat	25,086 (98.6%)	24,824 (97.6%)	24,824 (97.6%)
Total Acres of unsuitable Lynx Habitat	345 (1.4%)	262(1.0%)	607 (2.4%)
Meets VEG S1 – No more than 30% of the lynx habitat in an LAU currently in Stand Initiation Structural Stage.	Yes – 1.4%	Yes – 1.0%	Yes – 2.4%
Meets VEG S2 – Timber mgmt. projects shall not regenerate more than 15% of lynx habitat in a ten-year period.	Yes – 1.4%	Yes – 1.0%	Yes – 2.4%

Table 38. Expected Change to Needle-Razor LAU Baseline from the Proposed Action and use of the Exceptions under the SRLA. Existing baseline source is the December 2010 Revised Lynx Habitat Model.

Needle-Razor LAU Habitat Description	Existing Baseline - Acres (%)	Proposed Action – Acres (%)	Acres and total percent change (baseline + proposed action)
Total LAU Acres	48,536 (100)	48,536 (100%)	48,536 (0%)
Non-habitat acres	30,632 (63.1)	30,632 (63.1)	30,632 (0%)
Total Acres of Suitable Lynx Habitat	17,822 (99.5%)	17,849 (97.6%)	24,824 (97.6%)
Total Acres of unsuitable Lynx Habitat	82 (0.5%)	27 (0.2%)	109 (0.7%)
Meets VEG S1 – No more than 30% of the lynx habitat in an LAU currently in Stand Initiation Structural Stage.	Yes – 0.5%	Yes – 0.2%	Yes – 0.7%
Meets VEG S2 – Timber mgmt. projects shall not regenerate more than 15% of lynx habitat in a ten-year period.	Yes – 0.5%	Yes – 0.2%	Yes – 0.7%

### Canada Lynx – Direct and Indirect Effects, Alternative 2

**Direct Effects on Species** – Effects to lynx would be the same as described for the proposed action. Treatments under Alternative 2 are essentially the same as those proposed in Alternative 1. The economic viability alternative does reduce the miles of temporary roads to be created and there is also a reduced amount of acreage to be mechanically treated. Clear cut activities and the construction of 1.4 miles of temporary road will result in the conversion of 291 acres of suitable habitat to a Stand Initiation Structural Stage or unsuitable habitat.

**Indirect Effects on Species** – Indirect effects would also be the same as described for the proposed action. The only difference would be that DHC levels on 291 acres would result in less than optimal conditions due to clear cut treatments and the construction of temporary roads. The difference in the amount of habitat impacted would occur within the Cochetopa LAU. All treatments occurring in the Needle-Razor LAU and in the Cochetopa-North Pass LLA are the same as described in Alternative 1.

**Canada Lynx – Direct and Indirect Effects, Alternative 3 (No Action)**

**Direct Effects on Species** – There would be no direct effects to lynx as a result of the no action alternative. No treatments would occur and there would be no loss of suitable habitat, no risk of displacement or mortality to lynx in the area.

**Indirect Effects on Species** – Forested stands in the Cochetopa Hills area would remain unchanged allowing for the continued natural growth and development of stands in the area. Existing DHC levels would remain unchanged and over time, these levels would increase. As the vegetation continues to grow, the stands would increase in density and over time, natural mortality would occur as larger healthier trees out compete smaller trees. This would increase the amount of fuel in the stands putting the stands at an increased risk of a high intensity fire burning through the stands and potentially resulting in a stand replacing event. A fire burning through the area would lower the quality of suitable habitat for lynx or in the worst case scenario result in a loss of habitat in the action area.

**Determination for the Proposed Action:**

Based on this analysis, it is determined that the Cochetopa Vegetation Management project ***“May Affect, Not Likely to Adversely Affect”*** the Canada lynx.

The rationale for this conclusion is based on:

- Treatment units were excluded from spruce-fir stands, and from stands meeting the SRLA standard for DHC. Treatments will occur in even-aged stands.
- Direct effects to lynx are not measurable and are considered to be of insignificant and discountable effects. Indirect effects of the proposed project include changes in vegetation structure that will in the long term improve stand conditions, promoting uneven age classes and benefitting snowshoe hare habitat in the long term. Treatments will have a short term effect to snowshoe hare habitat, the lynx’s primary prey base and will temporarily displace snowshoe hares from the project area. In conjunction with the spruce bark beetle epidemic impacting Engelmann spruce trees in the planning area, this may also cause lynx to displace from treated areas due to the change in distribution of snowshoe hare and red squirrel prey species. Project design criteria would be in place to protect dense horizontal cover and minimize potential effects on lynx and their primary habitats in treatment areas in a manner consistent with the SRLA.
- The proposed action will convert lynx habitat to a Stand Initiation Structural Stage (SISS), however, the amount of habitat converted is small and well within VEG S1 and S2 standards. Areas that are being converted are composed of tree species that depend on mortality within the stand to promote regeneration (ie. aspen) and are not considered primary habitat for lynx.
- The proposed action will temporarily increase snow compaction for up to 10 years, resulting in increased indirect effects.

The proposed action is in compliance with the SRLA Vegetation Standards, objectives and guidelines, and no exemptions or exceptions will be used in the implementation of the project.

**North American Wolverine (*Gulo gulo luteus*)**

The wolverine is included in this analysis because proposed management activities involve suitable, but currently unoccupied habitat. Although occasional sightings of wolverine occur and are reported on the Forest, there had been no confirmed occurrences locally or in Colorado since 1919 until the recent arrival of M56, an individual male who arrived in 2009 from Wyoming and apparently remains in the north-central portion of the state (Colorado Division of Wildlife Website, Species of Concern, Wolverine, 2013). In addition, a wolverine was documented as a traffic-related mortality on Interstate 70 in 2012 within Region 3 of the Colorado Department of Transportation (CDOT 2012b).

**Wolverine - Direct, Indirect and Cumulative Effects of the Proposed Action**

Given that all potential habitat associated with the proposed action is currently unoccupied there will be no direct effect to the species. However, if the species is eventually reintroduced to or recolonizes Colorado, activities such as vegetation management and fuels reduction are not expected to have measureable influences on wolverine habitat because changes in vegetative characteristics has a little affect to the species.

**Wolverine - Direct and Indirect Effects, Alternative 2**

Effects to wolverine would be the same as described for the proposed action. Treatments under Alternative 2 are essentially the same as those proposed in Alternative 1.

**Wolverine – Direct and Indirect Effects, Alternative 3**

There would be no direct effects to wolverine as a result of the no action alternative. No treatments would occur and there would be no loss of suitable habitat in the project area.

**Determination for the Proposed Action**

Based on this analysis, it is determined that the proposed management activities associated with this analysis ***“will not jeopardize”*** the wolverine or influence any future options for achieving a self-sustaining population in the Southern Rocky Mountains.

**Forest Service Sensitive Species: Direct and Indirect Effects of the Proposed Action****Gunnison Sage Grouse (*Centrocercus minimus*)**

The Gunnison sage grouse is currently proposed by USFWS to be listed as endangered under ESA on January 11, 2013 and is a Region 2 Forest Service sensitive species. This species occurs in seven isolated populations in southwest Colorado and eastern Utah. The population nearest to the Cochetopa Hills project area is the Gunnison Basin. This population consists of an estimated 4,000 individuals and 26 active leks (CPW 2012). Gunnison sage grouse are found at an elevation range of 7,500 feet to over 9,500 feet in sage brush habitat. Habitat types include mountain big sagebrush, Wyoming big sagebrush, and black sage. Portions of the Cochetopa Hills project area do include suitable winter habitat for Gunnison sage grouse.

Direct effects to Gunnison sage grouse include noise due to implementation activities, the presence of personnel and smoke resulting from prescribed fire activities. All of these activities would result in the temporary displacement of grouse in the treatment area. The project area does include winter habitat for grouse and it is unlikely the area is used during the breeding season.

Indirect effects include changes in habitat where prescribed burning activities occur. It will result in degradation of habitat in the short term, but over time as grasses and brush sprout in response to prescribe fire treatments, habitat will improve.

#### **Northern Goshawk (*Accipiter gentilis*)**

The northern goshawk is a Region 2 Forest Service sensitive species and a Management Indicator Species (MIS). Goshawks are known to occur and appear well distributed on the Forest based on the distribution of known nest sites and goshawk sightings, although knowledge of the distribution and abundance of this species across the Forest is limited. The population trend is considered to be declining in the Central Rocky Mountain Physiographic Region based on Colorado Partners in Flight data (CPIF 2013). The primary threat to goshawk populations is habitat alteration due to timber management practices.

There is suitable habitat and known nest sites in the Cochetopa Hills planning area. Two nest sites are confirmed to be occupied this year and are located over 0.5 mile from a treatment unit. There are two historical nest sites located within treatment units. Both of these nests have been found to be unoccupied. In compliance with GMUG Forest Plan Standards and Guidelines, timing restrictions will be applied to occupied nests with a minimum buffer distance of  $\frac{1}{4}$  mi.

Direct effects to northern goshawks include noise due to the presence of heavy equipment operations, chainsaws, the presence of personnel and smoke associated with prescribed fire activities. Noise disturbance and smoke may result in the temporary displacement of goshawks in the area. There are no active nest sites located within treatment units and design features included in the proposed action and in compliance with Forest Plan direction will restrict activities during the breeding season and will also require raptor surveys to determine the locations of individuals (particularly active nest sites) or populations each year. These design features will minimize impacts to active goshawk nest sites and provide protection to these sites during implementation of the proposed action.

Another direct effect to goshawks is loss of habitat due to clearcut activities. Approximately 244 acres of aspen stands and 144 acres in conifer stands will be clear cut to promote regeneration. None of these clear cut units are located near an active or historical goshawk nest sites however, these areas may be used as foraging habitat for goshawks. Clear cut activities will also result in a loss of foraging habitat because there would be no canopy cover in those areas. If aspen regeneration treatments are successful, this may benefit goshawks in the long-term by maintaining aspen stands throughout the landscape and promoting habitat that could be used by goshawks in the future.

Indirect effects to goshawks include changes in habitat structure and habitat quality. Treatments vary and include the removal of clumps of trees, overstory removal, thinning and prescribed fire. All of these treatments are located over 0.5 mile from active goshawk nest sites and will not affect nest stands.



There are two historical nest sites located in treatment units, none of which are in clear cut units. Mechanical treatments including overstory removal and thinning activities which will degrade habitat quality by decreasing canopy cover.

The quality of foraging habitat would be degraded except for prescribed burning treatments in conifer stands. These treatments are designed to treat surface and ladder fuels in the understory which will likely improve foraging habitat for goshawks because it would open up the understory, but not alter canopy cover. The proposed action also includes design features which require maintaining 300 snags/100 acres across the landscape, maintaining 10-20 tons per acre of coarse woody debris and maintaining large diameter downed logs of various decay composition within harvest units, all of which are important habitat elements for some goshawk prey species. The proposed project will also benefit northern goshawks and their habitat in the long term by improving the health of forested stands, promoting regeneration and lowering the risk of a stand replacing fire burning through the area.

**Boreal Owl (*Aegolius funereus*) and Flammulated Owl (*Otus flammeolus*)**

Boreal owls are a Region 2 Forest Service sensitive species. This species of owl is primarily found in mature and old growth coniferous forests especially spruce-fir and occasionally in lodgepole pine stands. There is suitable boreal habitat in the Cochetopa Hills project area, with one documented occurrence in 2007. A pair and juvenile were confirmed, and the nest site was associated with large mature aspen stands in the Lujan Creek drainage.

Flammulated owls are a Region 2 Forest Service Sensitive species. These owls are found in old-growth or mature ponderosa pine stands as well as open mixed conifer and aspen forests that contain large broken top and lightning damaged snags and trees. There is suitable habitat for flammulated owls in the project area, with documented occurrences in 2007. Owls were detected within the project area in the Lujan Creek drainage and on the adjacent Rio Grande National Forest in March, 2007.

Direct effects to owls include noise disturbance and smoke associated with prescribed fire activities. Noise disturbance resulting from the use of heavy equipment, chainsaws and personnel implementing the project as well as smoke may cause the temporary displacement of roosting owls. Project activities will also remove suitable habitat which could result in the permanent displacement of owls if they are using areas where clear cut treatments are planned to occur. There will be a loss of approximately 144 acres of suitable habitat resulting from clear cut treatments.

Indirect effects will be changes in habitat quality due to a decrease in canopy cover. Nest sites for both species will still be available because the proposed action includes a design feature that requires maintaining the largest snags at a rate of 300 snags/100 acres across the landscape. Snags will also be retained in clumps to minimize loss of snags due to weather events. In addition, the proposed action includes design features that require maintaining 10-20 tons per acre of coarse woody debris and maintaining large diameter downed logs of various decay composition within harvest units which are important habitat elements for boreal owl prey species. The proposed project will also benefit owl species and their habitat in the long term by improving the health of stands and habitat, promoting regeneration and lowering the risk of a stand replacing fire burning through the area. Under the

proposed action, there will be no treatment activities within the vicinity of documented boreal and flammulated owl locations. The locations where owl vocalizations were recorded and the location of the documented boreal owl nest site do not occur in treatment units. Annual raptor surveys will be conducted in the Planning Area. If new occurrences are documented, conservation measures will be applied consistent with the design criteria and timing restrictions described above.

**Olive-sided Flycatcher (*Contopus cooperi*)**

The olive sided flycatcher is a Region 2 Forest Service sensitive species. They are found in mature spruce-fir and mixed conifer forests and are closely associated with burned areas where they take advantage of the open forest structure for prey. Suitable habitat does exist for olive sided flycatchers in the Cochetopa Hills project area. There are no known recorded sighting of this species in the area however olive-sided flycatchers have been documented in similar habitats elsewhere on the Gunnison Ranger District.

Direct effects to olive sided flycatchers include noise due to the presence of heavy equipment operations, chainsaws, the presence of personnel and smoke associated with prescribed fire activities. Noise disturbance and smoke may result in the temporary displacement of flycatchers in the area. The proposed project would result in a loss of approximately 144 acres of nesting habitat as a result of clear cut treatments in conifer stands. This would result in permanent displacement of individuals if they are using these areas as nesting habitat.

Indirect effects include changes in habitat structure and composition within all treatment units. Nesting habitat will likely be degraded after treatments occur with the density of trees decreasing and canopy cover also decreasing. However, foraging conditions will improve because stands will be more open which is preferred by flycatchers for foraging. The proposed project will also benefit olive sided flycatchers and their habitat in the long term by improving the health of forested stands, promoting regeneration and lowering the risk of a stand replacing fire burning through the area.

**Northern Leopard Frog (*Lithobates pipiens*)**

The northern leopard frog is a Region 2 Forest Service sensitive species. The elevation range is below 3,500' to above 11,000 feet. They are found in wet meadows, the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams and irrigation ditches. They were once widely distributed in Colorado, but are now rare or extirpated in many areas, especially in the mountains. There is suitable habitat for northern leopard frogs in the Cochetopa Hills project area. There are no recorded observations of this species in the project planning area.

Direct effects to northern leopard frogs include crushing or injuring individuals by heavy equipment or by personnel conducting treatments in the area. It is highly unlikely since there are no current documented occurrences of the species in the analysis and project area (there is likely a low probability of presence based on the fact that leopard frogs have not been found in aquatic habitats anywhere in the Analysis Area), and project design criteria should avoid disturbance to aquatic habitats..

Indirect effects to northern leopard frog habitat are expected to be minimal. Based on the hydrology report for the Cochetopa Hills project, the proposed vegetation treatments are expected to have minimal adverse effects on water quality based on treatment prescriptions. Best Management Practices (BMPs) as described by the regionally adopted Watershed Conservation Practices Handbook (US Forest Service, 2006), will minimize any adverse effects to water quality. Riparian areas will be degraded by treatment activities however, BMPs (including buffers of aquatic areas) will also assure that riparian wetland and riparian features maintain their function on the landscape.

#### **Gunnison's Prairie Dog (*Cynomys gunnisoni*)**

The Gunnison's prairie dog is a Region 2 Forest Service sensitive species and was recently warranted not to be listed by USFWS based on a status review finding. Habitat for this species includes level to gently sloping grasslands and semi-desert and montane shrublands, at elevations from 6,000 to 12,000 feet (1,830 to 3,660 meters). They occupy grass-shrub areas in low valleys and mountain meadows within this habitat. The current distribution of the species warranted for listing includes central and south-central Colorado and north-central New Mexico. In Colorado, the Colorado Department of Wildlife (CDOW) has estimated there is approximately 6.9 million acres of suitable habitat available for Gunnison's prairie dogs. They also estimated occupancy of prairie dogs in suitable montane habitat was only 3.2% in 2005 and 3.6% in 2007. There are no recorded observations of Gunnison's prairie dogs in the Cochetopa Hills Vegetation Management planning area.

The primary threats to Gunnison's prairie dog populations include shooting (both recreational and as a form of pest management on ranch and agricultural land), disease (sylvatic plague) and predation.

Prescribe fire activities in grass/shrub habitat will temporarily alter habitat conditions for Gunnison's prairie dogs. The effect will be short term as grasses and shrubs tend to regenerate in response to fire. Treatments will improve habitat conditions in the short term (we anticipate herbaceous vegetation to regenerate and increase above pre-burn conditions within 1 – 2 years) by improving forage conditions and the ability for prairie dogs to detect predators. If there are prairie dogs occurring in the area, they may be temporarily disturbed as a result of treatment activities. However, the USFWS status review and recent not warranted listing decision (<http://www.gpo.gov/fdsys/pkg/FR-2013-11-14/pdf/2013-27196.pdf>) did not identify public land vegetation management activities as a primary threat affecting the Gunnison's prairie dog.

#### **Hoary Bat (*Lasiurus cinereus*)**

In Colorado, this species probably occurs across the state from the plains to timberline from April to November. There are no records of hoary bats hibernating in Colorado. There is suitable habitat for hoary bats in the Cochetopa Hills project area, however no sightings of this species have been documented.

Direct effects to hoary bats include the removal of an occupied roost tree which could result in injury, death or displacement of individuals. If individuals are roosting in the immediate vicinity of the project area they may be disturbed by the noise or vibration generated by project activities. This could result in temporary displacement of individuals. Impacts resulting from displacement would be greatest during

the maternity and the winter roosting seasons. Roosting habitat will be degraded in clear cut units and the proposed project does include a design feature that maintains 300 snags/100 acres across the landscape. This design feature also applies to clear cut units so although habitat will be degraded, there will be snags that can be used as roost sites for bats. The largest diameter snags will be maintained and they will be in clumps where possible.

There may be an increased risk of predation if individuals are displaced and unable to locate suitable alternate roosting habitat. Also, vegetation treatments will modify foraging habitat, however it will not remove or decrease the amount of available foraging habitat. The proposed project will also benefit hoary bats and their habitat in the long term by improving the health of forested stands and bat habitat, promote regeneration in stands and lowering the risk of a stand replacing fire burning through the area.

#### **American Marten (*Martes Americana*)**

The American marten is a Region 2 Forest Service sensitive species and a MIS. In Colorado, they are found in old-growth subalpine forests of spruce, fir or lodgepole pine and prefer mesic mature coniferous forests, with a complex physical structure near the ground (Watt et al. 1996). The Forest currently supports approximately 600,925 acres of denning, resting and foraging habitat for Marten.

Documented occurrences of marten in lodgepole pine forests on the Gunnison Ranger District. These cover types with marten occurrences have typically been associated with large diameter downed wood, large diameter standing trees, leaning logs and trees, decayed or overturned stumps, snags and coarse woody debris in various decay stages, and large rocks, trees, or saplings. Where marten detections have occurred in aspen, spruce-fir has been a component of the tree species mix within those stands or spruce-fir stands were adjacent to those aspen stands. There is suitable habitat for martens in the project area with marten occurrences documented during the field seasons of 2005 and 2006.

Direct effects to American marten include noise due to the presence of heavy equipment during treatment activities, and smoke resulting from prescribed fire activities such as broadcast burning. Noise disturbance and smoke may result in the temporary displacement of martens in the area. Project activities will also remove approximately 388 acres of suitable habitat due to clear cut treatments in aspen and mixed conifer stands.

Indirect effects include changes to stand structure and composition. All treatments will alter stand structure which will degrade habitat for martens. Some habitat elements will be retained, but at decreased levels compared to the existing condition. The proposed project includes design features which require maintaining 300 snags/100 acres across the landscape, and maintaining large diameter downed logs of various decay composition within harvest units which are important denning elements for martens. Foraging habitat would be degraded because project activities would result in stands that are more open leaving less cover for martens when they are hunting. The proposed project will also benefit martens and their habitat in the long term by improving the health of forested stands, promoting regeneration and lowering the risk of a stand replacing fire burning through the area. Areas of primary marten habitat (spruce-fir) will not be impacted since the proposed action excludes

treatments in spruce-fir stands. Forest stands where martens were detected from past surveys are not included in the proposed action.

### **Pygmy Shrew (*Sorex hoyi*)**

The pygmy shrew is a Region 2 Forest Service sensitive species. Its range includes Alaska into British Columbia and across central and southern Canada, the Great Lakes region, and extends southward from the Rocky Mountains into Idaho, northwestern Montana with isolated occurrences in the Southern Rocky Mountains of Colorado and Wyoming. There is suitable habitat for pygmy shrews in the project area however there are no recorded occurrences of this species in the area.

Direct effects to pygmy shrews include trampling and crushing due to the use of heavy equipment and the presence of personnel. There are no recorded observations of this species in the project area and due to the dry conifer types and overall dry conditions in the Planning Area, there is a lack of suitable habitat or only marginal habitat available to support this species. Due to these factors, this species has a low likelihood of occurring in the project area, and therefore is unlikely to be affected by project activities. Project activities will also remove approximately 144 acres of potentially suitable habitat due to clear cut treatments in conifer stands.

Indirect effects include changes to stand structure. All treatments will alter stand structure which will degrade habitat for pygmy shrews. Coarse woody debris will likely be lower as a result of treatment activities and a design feature included in the proposed project will maintain coarse woody debris level at 10-20 tons per acre in harvest units. Large diameter logs at different decay composition stages will also be retained which may provide additional cover for shrews. The proposed project will benefit pygmy shrews and their habitat in the long term by improving the health of forested stands, promoting regeneration and lowering the risk of a stand replacing fire burning through the area.

### **Forest Service Sensitive Species, Direct and Indirect Effects, Alternative 2**

Direct and indirect effects for all species analyzed will be the same as described for the Proposed Action except at a smaller magnitude. Alternative 2 treats fewer acres and will also require a lower amount of temporary road construction. Treatment activities are essentially the same.

### **Forest Service Sensitive Species, Direct and Indirect Effects, Alternative 3**

There will be no direct effects as a result of the Alternative 3. There would be no treatments under this alternative and stands would remain as they exist.

There would be indirect effects with Alternative 3. Since no treatments would occur, stands in the project area would continue to grow. Competition within stands will result in smaller, younger trees being shaded out and out competed by older, taller, stronger trees. Eventually the smaller trees will

likely die resulting in an increase in fuel loads. If a high severity wildfire were to occur in these stands, it could result in a stand replacing event.

#### Determination of Effect and Rationale

Based on this analysis, it was determined that the Cochetopa Vegetation Management project ***“May Affect, Not Likely to Adversely Affect”*** the Gunnison sage grouse and northern leopard frog. The rationale for this conclusion is based on:

- Treatment activities will affect habitat quality in the short term, but will not result in a loss of habitat.
- In the long term, the proposed project will benefit both species and their habitat by reducing the risk of a stand replacing high severity wildfire from occurring.

Based on this analysis, it was determined that the Cochetopa Vegetation Management project ***“May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*** for the northern goshawk, boreal owl, flammulated owl, olive sided flycatcher, hoary bat, Gunnison’s prairie dog, American marten and pygmy shrew. The rationale for this conclusion is based on:

- Active nest sites for goshawks will not be affected by treatment activities. A design feature included in the proposed action does require ongoing raptor surveys to determine where they are occurring and to implement protection measures for any active nest sites.
- Changes in habitat quality will be degraded, but design features included in the proposed action will retain some important habitat elements including snags, downed logs and coarse woody debris levels.
- Clear cut treatments will remove approximately 244 acres of aspen stands and 144 acres of conifer stands. The loss of conifer stands will affect multiple species, but habitat will still exist in areas adjacent to these units.
- Treatments will reduce the risk of a high severity fire resulting in a stand replacing event. This will benefit species and their habitat.

#### Management Indicator Species, Direct and Indirect Effects

Management Indicator Species (MIS) for the GMUG National Forests are identified in the Forest Plan on Table II-15 and II-16, pages II-42 and II-43. An MIS Forest Plan Amendment in 2005 reduced the number of MIS from seventeen to 12. Information for each species is partially adapted from species assessments prepared for the GMUG NF. A full description of each species’ life history and biology can be found in the BA/BE/MIS located in the project record.

Rocky Mountain elk, Abert’s squirrel, American marten, northern goshawk and red naped sap sucker all have the potential to occur in the Cochetopa Hills project area.

**Rocky Mountain Elk**

All vegetation types present on the Forest provide suitable elk habitat. Colorado Division of Wildlife NDIS database shows that the Forest is used year-round by elk mainly in early successional stages of vegetation near hiding cover. Elk herds are known to use the southern and central portion of the Cochetopa Hills project area as winter habitat. Herds have been seen in open areas adjacent to forested habitat on private land and on the Forest (Vasquez 2013). Currently, most elk herds in the state of Colorado are at or near population objectives.

**Effects of Alternatives 1 and 2**

Effects to elk populations as a result of Alternatives 1 and 2 include noise disturbance due to treatment activities and the presence of personnel. Activities may cause elk to displace from the project area. A design feature which restricts treatment activities if elk herds are found to be wintering in the project area would minimize effects to elk.

Both Alternatives will affect winter habitat for elk as a result of changes in the structure and composition of vegetation in the area. In forested areas, treatments will remove trees which will reduce the amount of cover and forage available for elk. Elk may still use these areas, but will likely move through them to areas that provide better cover and forage. Alternatives 1 and 2 will also improve the health of forested stands by promoting regeneration. It will also lower the risk of a stand replacing fire burning through the area which will help to protect habitat for elk.

Prescribed fire treatments in grass/shrub areas will temporarily decrease the amount of forage available, however over time, forage quality will improve as grasses and shrubs sprout in response to fire activities. The project will also improve the health of forested stands and grass/shrub areas by promoting regeneration. In forested stands, Alternatives 1 and 2 will lower the risk of a stand replacing fire burning through the area which will help to protect habitat for elk.

Alternatives 1 and 2 will not affect population trends of Rocky Mountain elk. Both alternatives will affect the distribution of elk in the area in the short term. The difference in of the effects between the proposed action (Alternative 1) and the economic viability alternative (Alternative 2) would be the magnitude of effects. The proposed action will treat more acres than the economic viability alternative.

**Effects of Alternative 3**

There will be no effects as a result of the No Action alternative. No treatments will occur and vegetation in the area would continue to naturally develop.

**Abert's Squirrel**

The Abert's squirrel, commonly known as the 'tassel-eared' squirrel, is a management indicator species for late succession ponderosa pine (*Pinus ponderosa*) forests on the Forest. Approximately 147,574 acres (4%) of the Forest is habitat for Abert's squirrel. Habitat includes ponderosa pine, Gambel oak, pinyon-juniper, and Douglas-fir cover types. The majority of this habitat includes 111,183 acres of

ponderosa pine (3% of the Forest). Importantly, ponderosa pine distribution on the Forest, especially the Gunnison Basin Geographic area, is underrepresented based on the R2-Veg database; consequently, potentially available habitat for the Abert's squirrel may also be under-represented. The Cochetopa Hills project area includes ponderosa pine stands on 2,827 acres.

Abert's squirrel populations have fluctuated widely over the last 100 years. Squirrel abundance may vary greatly and frequently, as influenced by weather conditions and food supplies. Importantly, populations are influenced by forest management practices that alter squirrel habitat condition. On the Forest, Abert's squirrel populations exist at the periphery of their northwest distribution in Colorado and may be more dynamic compared to interior areas of their distribution. Although populations have fluctuated, their viability does not appear to be threatened or in danger of extinction at the Forest level.

### **Effects of Alternatives 1 and 2**

Effects to Abert's squirrel populations as a result of Alternatives 1 and 2 include noise disturbance due to treatment activities and the presence of personnel. Activities may cause squirrels to temporarily displace from the project area.

Both alternatives will affect Abert's squirrel habitat due to changes in the structure and composition of forested areas. Clear cut activities will result in the removal of approximately 144 acres of habitat. Other treatments will also remove individual trees which will decrease the quality of habitat for Abert's squirrels. Removal of trees is intended to improve the health of forested stands by promoting regeneration and by lowering the risk of a stand replacing fire burning through the area which will help to protect habitat for Abert's squirrels.

The proposed project will not affect population trends of Abert's squirrels. It will affect the amount and quality of habitat available and over time, habitat conditions are expected to improve.

### **Effects of Alternative 3**

There will be no effects as a result of the No Action alternative. No treatments will occur and vegetation in the area would continue to naturally develop.

### **American Marten**

Twenty-eight marten territories are estimated to occur on the Forest. Less than 1% of suitable marten habitat has been surveyed, therefore the actual number of marten territories on the Forest is unknown. Year-to-year fluctuations in population size of marten are common, and typically correlate with fluctuations in densities of small mammals (Weckwerth and Hawley 1962, Buskirk and Ruggerio 1994, Fryxell et al. 1999). However, descriptions of long-term changes in densities are virtually absent from the literature (Buskirk 2002). Since such a small percentage of the available marten habitat has been inventoried, population trends on the Forest cannot be determined.



**Effects Alternatives 1 and 2**

Effects to American marten populations as a result of Alternatives 1 and 2 include noise disturbance due to treatment activities and the presence of personnel. Activities may cause martens to temporarily displace from the project area.

Both alternatives will affect marten habitat due to changes in the structure and composition of forested areas. Clear cut activities in aspen stands and in conifer stands will result in the removal of approximately 388 acres of habitat. Other treatments will alter stand structure which will degrade habitat for martens. Some habitat elements will be retained, but at decreased levels compared to the existing condition. Design features included in the proposed project require maintaining 300 snags/100 acres across the landscape, and maintaining large diameter downed logs of various decay composition within harvest units which are important denning elements for martens. Foraging habitat would be degraded because project activities would result in stands that are more open leaving less cover for martens when they are hunting. Treatment activities are intended to improve the health of forested stands by promoting regeneration and by lowering the risk of a stand replacing fire burning through the area which will help to protect habitat for martens. As described in the Sensitive Species analysis for marten, primary habitat (Engelmann spruce-subalpine fir) for this species will not be affected since spruce-fir stands are excluded from the proposed action.

The proposed project will not affect population trends of martens. It will affect the amount and quality of habitat available and over time, habitat conditions are expected to improve.

**Effects of Alternative 3**

There will be no effects as a result of the No Action alternative. No treatments will occur and vegetation in the area would continue to naturally develop.

**Northern Goshawk**

Currently, there are no long-term indices of trends or estimates of goshawk breeding population size in North America (Braun et al. 1996, Kennedy 2003). There is not sufficient information available to determine the population status across Colorado or within Region 2. Breeding Bird Survey (BBS) and Christmas Bird Count (CBC) data is not sufficient because there are not enough routes to cover goshawk habitat and detections of birds is low. Although there is no data to determine population status and trend, it is thought the population is declining due to the amount of habitat alteration projects.

Surveys for goshawks have occurred on the Gunnison Ranger District over the last 20 years. Based on survey information, there is an estimated 15 known territories based on detections and associated nest sites and 24 territories based on detections during the breeding season with no associated known nest

site. Overall, it is believed the species is well distributed across the Forest and has not shown any obvious change in population.

### **Effects of Alternatives 1 and 2**

Effects to northern goshawk populations as a result of Alternatives 1 and 2 include noise disturbance due to treatment activities and the presence of personnel. Activities may cause goshawks to temporarily displace from the project area. There are no treatment activities located within 0.50 mile of a known active goshawk nest. A design feature included in the proposed action requires surveys to be completed for raptors in the project area each year. If an active nest site is found within a treatment unit, avoidance measures will be taken.

Both alternatives will result in changes in habitat structure and habitat quality. Treatments vary and include the removal of clumps of trees, overstory removal, thinning and prescribed fire. Treatments are not expected to affect goshawk nest sites. Treatments will however, degrade existing habitat by decreasing canopy cover. The quality of foraging habitat would also be degraded except for prescribed burning treatments in conifer stands. These treatments will likely improve foraging habitat for goshawks because it would open up the understory, but not alter canopy cover. The proposed action also includes design features which will minimize effects to important habitat elements for some goshawk prey species. Alternatives 1 and 2 will improve the health of forested stands by promoting regeneration and lowering the risk of a stand replacing fire burning through the area which will protect goshawk habitat.

### **Effects of Alternative 3**

There will be no effects as a result of the No Action alternative. No treatments will occur and vegetation in the area would continue to naturally develop.

### **Red-Naped Sapsucker**

The Rocky Mountain Bird Observatory has developed a program entitled Monitoring Colorado's Birds (MCB), which they have implemented on a yearly basis since 1998. MCB data has shown relative abundances for red-naped sapsuckers in Colorado ranging from 0.04 to 9.35 birds per hectare. The MCB program has sampled approximately 14,081 acres of the Forest, which was estimated by buffering each point-count transect by 250 meters. Since counts began in 1998, detections of sap suckers have remained constant on the Forest.

### **Effects of Alternatives 1 and 2**

Effects to red-naped sapsucker populations as a result of Alternatives 1 and 2 include noise disturbance due to treatment activities and the presence of personnel. Activities may cause squirrels to temporarily displace from the project area.

Both alternatives will affect sapsucker habitat due to changes in the structure and composition of aspen stands. There is approximately 7,520 acres of aspen stands in the Cochetopa Hills planning area. Of that

acreage 244 acres (3%) will be clear cut. Clear cut activities will occur in stands that are dense and are not showing signs of regeneration. This treatment will improve the health of these stands by promoting regeneration which should help maintain aspen on the landscape and promote the future development of habitat for the red-naped sapsucker.

All treatment activities proposed in both alternatives will lower the risk of a stand replacing fire burning through the area which will help protect habitat for red-naped sapsuckers.

The proposed project will not affect population trends of red-naped sapsuckers. It will affect the amount and quality of habitat available and over time, aspen stands are expected to regenerate which will provide healthier aspen stands in the planning area.

### **Effects of Alternatives 3**

There will be no effects as a result of the No Action alternative. No treatments will occur and vegetation in the area would continue to naturally develop.

#### *3.8.3. Cumulative Effects, Wildlife – Alternatives 1 and 2*

The proposed project would cumulatively increase adverse effects on Forest Service land when reviewed with other projects/activities. Disturbance from treatment activities will be short term and will be due to the presence of personnel and equipment during project implementation. Vegetation treatments included in the proposed action will alter existing habitat conditions for lynx and in some cases, it will temporarily reduce the amount of suitable habitat available. These effects will last through the life of the project, however the magnitude of the effects will decrease in time. That is, after treatments are completed, the stands will continue their natural processes which will slowly improve habitat conditions and slowly increase the amount of suitable habitat available.

Activities such as grazing, recreation use, road use and maintenance and the presence of private land around the project area will have a continued impact on wildlife in the area. Wildlife are used to the activities associated with recreation and with road maintenance as it has been occurring for years and on a regular basis. Grazing activities appear to continue on private land and within the project area. This activity will continue to affect vegetation, soil and water quality in the area and may impact prey populations for lynx. The proposed project will increase cumulative effects to lynx when combined with these activities.

In summary, this cumulative effects analysis suggests that in combination with all past, present, and reasonably foreseeable future activities within the LAUs, all standards and guidelines, exemptions and exceptions contained within the SRLA pertaining to habitat thresholds would be met with the implementation of this project. Therefore, potential cumulative effects would not influence the overall effects determination.

Cumulative effects for Alternative 2 would be the same as described for Alternative 1. Alternative 2 would treat a reduced number of acres, but those acres that are treated will degrade habitat conditions.

There would also be a loss of habitat because of clear cut treatments. Alternative 2 when added to the list of past, present and reasonably foreseeable future projects, would adversely impact species analyzed in this document.

### 3.9. Fisheries

Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3). Under the ESA, the effects analysis report is called a biological assessment (BA) and must be prepared for federal actions that are “major construction activities” to evaluate the potential effects of the proposal on listed and proposed species and critical habitats. The contents of the BA are at the discretion of the federal agency, and will depend on the nature of the federal action (50 CFR 402.12(f)). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the NEPA process ensures that TEPS species receive full consideration in the decision-making process. These documents are available in the project file at the Gunnison Ranger District office.

#### *3.9.1. Existing Conditions - Fisheries*

There are approximately 1.83 miles of perennial streams that intersect proposed vegetation treatments within the project area, including sections of Lujan Creek (0.17 miles) and Monchego Creek (1.66 miles). Mechanical harvest is the proposed treatment for the area around Lujan Creek. Prescribed burning is the proposed treatment for the area around Monchego Creek. A review of data summaries in the Species and Conservation Assessments for all three common trout species (Adams et al., 2008a, b, c) was conducted in order to determine whether there were data available for these streams. No population data have been collected in these streams in the last eight years. Based on the information provided by the CDOW, there are less than 2 miles of fish-bearing streams within the project area.

#### *3.9.2. Direct and Indirect Effects, Fisheries – Alternatives 1 and 2*

The proposed action includes two alternatives in addition to a no-action alternative. Since existing conditions would not change if the no-action alternative was implemented it will not be discussed further in this document.

Alternatives 1 and 2 both include a broad array of timber management activities including mechanical treatments and prescribed burning. Alternative 1 would result in 5,960 acres of forest treated using

mechanical techniques and 5,897 acres of forest treated using prescribed burning. Alternative 2 would result in 4,104 acres of forest treated using mechanical techniques and 7,336 acres of forest treated using prescribed burning.

Both alternatives include the construction, use, and maintenance of road infrastructure to transport equipment and forest products (Table 39).

Table 39. Summary of Road Maintenance and Construction Activities Associated with the Cochetopa Hills Vegetation Management Project.

Road	Alternative 1 (miles)	Alternative 2 (miles)
<b>Forest System Roads</b>		
Standard road maintenance	21.9	20.0
Road decommission	2.5	0.7
Upgrades to existing roads	13.5	2.7
Maintain or reconstruct haul roads	17.4	16.2
New road construction	4.7	1.4
Open administratively closed routes	11.2	11.2
<b>County Roads and State Highway 114</b>		
Cochetopa Park Road	5.3	5.3
Saguache County RD NN-14	16.6	16.6
Saguache County RD 17-FF	2.2	2.2
Saguache Park Road	6.0	6.0
State Highway 114	13.9	13.9
<b>Total</b>	<b>118.4</b>	<b>96.3</b>

Neither alternative would create additional culverts because roads proposed for construction would not be routed across stream channels.

Following both alternatives, the existing roads identified for closure in the 2010 Gunnison National Forest Travel Management Plan would be closed. Additionally, temporary haul roads would be closed and administratively closed routes that were opened for use during the project would be closed following the completion of the project. New roads constructed under either alternative would be added to the Forest transportation system.

#### **Fish Species and Designated Critical Habitat Considered and Analyzed**

The following table summarizes fish species present on the Forest that could be affected by actions associated with the Cochetopa Hills Vegetation Management Project.

A review of the distribution of federally protected species on the GMUG NF, has determined that aquatic Management Indicator Species (MIS) are the only species potentially affected by this project.

The following narrative provides specific rationale for the exclusion of the other species listed in Table 40 from further analysis.

Table 40. Summary of Threatened, Endangered, Sensitive, and Management Indicator Species (MIS) Fish Species Present on the Forest.

Species	Scientific name	Status	Species or suitable habitat present in project area?
Bonytail chub	<i>Gila elegans</i>	Endangered	No
Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Endangered	No
Humpback chub	<i>Gila cypha</i>	Endangered	No
Razorback sucker	<i>Xyrauchen texanus</i>	Endangered	No
Colorado River cutthroat trout, greenback lineage	<i>Oncorhynchus clarkii pleuriticus</i>	Threatened	No
Colorado River cutthroat trout	<i>O. clarkii pleuriticus</i>	Sensitive	No
Brook trout	<i>Salvelinus fontinalis</i>	MIS	Yes
Brown trout	<i>Salmo trutta</i>	MIS	Yes
Rainbow trout	<i>O. mykiss</i>	MIS	Yes

Activities that result in water depletions on the Forest lands can have an adverse effect on the bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker, all of which reside in rivers downstream from the action area. The Cochetopa Hills Vegetation Management Project, however, will not result in any additional water depletions that could impact downstream habitats.

Although streams in the project area have suitable water quality to support Colorado River cutthroat trout, the habitat is unsuitable in its current form due to the presence of one or more non-native fish species. Non-native species present include the MIS species listed in Table 40. There are no Conservation Populations of Colorado River cutthroat trout present in the project area and there are no existing plans to restore Colorado River cutthroat trout to streams within the project area.

#### Species Included in this Analysis

*Brook trout, brown trout, and rainbow trout* – Non-native salmonids, known collectively as common trout, are common in streams on the GMUG. Common trout populations have been propagated in most waters throughout the state by the Colorado Division of Wildlife for the purpose of sustaining recreational fisheries. Of the three species of common trout included in this analysis, large numbers of rainbow trout are raised in hatcheries and stocked in waters throughout the state.

Thorough reviews of the life history and ecology of the common trout species can be found in the Species and Conservation Assessments prepared by the GMUG NF (brook trout: Adams et al., 2008a; brown trout: Adams et al., 2008b; rainbow trout: Adams et al., 2008c). Brook trout are native to eastern North America. Brook trout spawn in the fall, are prolific breeders, and feed on a wide variety of stream insects. Brook trout are considered an invasive species in many parts of western North America and

have severely impacted native amphibians and fishes in watersheds into which they have been introduced. Brown trout are native to Europe and have been introduced throughout the world for the purpose of creating recreational fisheries. Brown trout spawn in the fall. Brown trout populations tend to exist at lower densities than other common trout. As they mature, brown trout switch from relying on stream insects to fish as their primary food source. Consequently, brown trout can mature at much larger sizes than other common trout. Rainbow trout are native to coastal portions of western North America. Rainbow trout have been transplanted into cold-water systems throughout the world because they are easily raised in hatcheries and adapt to a variety of habitats. Rainbow trout can interbreed with cutthroat trout (the only trout native to the Rocky Mountain region of western North America) which has contributed to the loss of cutthroat trout populations throughout their range.

The GMUG does not maintain comprehensive records of common trout populations. However, given extensive historical and on-going stocking, it is likely common trout inhabit hundreds of watersheds containing more than 1,000 miles of streams of the Forest. One or more species of common trout are assumed to be present in all perennial streams within the Cochetopa Hills project area. Because the effects associated with the project would impact each common trout species in the same way, the effects of the proposed action on common trout are analyzed as a group.

**Direct Effects**

Direct effects of timber harvest or prescribed burning on fish and their habitat are unlikely. It is possible that individual fish could be crushed by falling timber or that high-intensity fire (not common during prescribed burning) could heat water sufficiently to kill fish. However, the likelihood of these events is so rare that they are discountable.

**Indirect Effects**

Fish populations and their habitat could be affected indirectly by timber harvest and prescribed burning. Potential indirect effects include sedimentation from hillslopes where harvest has occurred or roadbeds that intersect or parallel stream channels, increased stream temperature where timber harvest has occurred in riparian areas, and decreased connectivity of stream habitats resulting from culverts that create barriers to fish passage.

Impacts associated with increased fine sediment in streams include reduced food availability and loss of pool habitat. Impacts associated with sedimentation can be lessened through the implementation of Best Management Practices (BMPs) associated with timber harvest. Retention of trees and other vegetation along riparian corridors to act as a buffer to overland transport of fine sediments is an example of a BMP that could be employed along fish-bearing streams.

Impacts associated with increased stream temperature due to increase light penetration to stream channels include reduction of individual growth rates as well as reduced reproduction. These impacts would only manifest themselves if stream temperatures were elevated beyond the thermal limits for common trout species. Riparian buffers would prevent increased light penetration to stream channels.

The impacts of reduced stream connectivity include the loss of life-history diversity and extirpation of isolated stream fish populations upstream from barriers. Since no additional culverts will be constructed as part of this project there will be no effects or impacts associated with culvert construction.

### *3.9.3. Cumulative Effects, Fisheries – Alternatives 1 and 2*

BMPs and project design elements (listed in Appendix B) are requirements that will protect riparian habitat and prevent sedimentation resulting from actions associated with this project. The use of these measures will lessen the chance of negative impacts to riparian and stream habitat. Based on this protection, and the fact that no culverts will be constructed during this project, it is concluded that the cumulative effects and impacts of activities associated with this project on common trout are discountable.

*Determination and rationale* – Based on this analysis of the proposed action and the extent of fish-bearing streams within the project area the following conclusion is made:

- 1) There are approximately 1.83 miles of fish-bearing streams within the project area.
- 2) These streams probably support at least one species of common trout.
- 3) BMPs and project design criteria will be put into place to protect riparian habitat and reduce the likelihood of fine sediment entering fish-bearing streams.
- 4) No new culverts will be associated with roads constructed for this project.

Therefore, this project may temporarily displace or alter how individuals use affected habitats through habitat alteration and/or disturbance, but these effects will not result in a change in population numbers or trends at the project or Forest scales.

## **3.10. Botany**

A Biological Assessment and Biological Evaluation was developed for the Cochetopa Hills Vegetation Management Project. Areas potentially impacted by project activities were surveyed for threatened, endangered, proposed, candidate, and sensitive plant species known or anticipated from the Cochetopa Hills Project and surrounding areas. The survey was conducted in 2013.

### *3.10.1. Existing Conditions – Botany*

The Cochetopa Hills planning area is comprised of a diversity of vegetation types with a range of proposed treatments. The action alternatives proposed, Alternatives 1 and 2, include both mechanical and prescribed burn treatments, as well as some road maintenance and construction (Table 41).

Alternative 3 is the “no action” alternative, which assumes that none of the elements of the proposed action would take place.



Table 41. Comparison of Selected Actions of Alternatives which Concern Forest Service Sensitive Plant Species.

<b>Mechanical vs. Burn Treatments</b>	<b>Alternative</b>	
	<b>Alt 1 (acres)</b>	<b>Alt 2 (acres)</b>
mechanical	5,960	4,104
prescribed burn	5,897	7,336
<b>Total</b>	<b>11,857</b>	<b>11,440</b>
<b>Prescribed Burn Treatments</b>	<b>Alternative</b>	
	<b>Alt 1 (acres)</b>	<b>Alt 2 (acres)</b>
Aspen Burn	37	37
P burn (DF/PP)	1,717	1,717
P burn (MC)	0	1,439
P burn (range)	4,143	4,143
<b>Transportation System</b>	<b>Alternative</b>	
	<b>Alt 1 (miles)</b>	<b>Alt 2 (miles)</b>
total haul roads	118.8	96.7
road segments to decommission (due to re-route)	2.5	0.7
roads to decommission (due to Gunnison Travel Plan)	4.6	2.3
new re-routed/extended roads	4.7	1.4
roads needing major re-construction	14.6	2.7
roads needing minor re-construction	17.8	16.6
roads to open (admin. closures)	11.2	11.2

### Threatened and Endangered Plant Species

Threatened and Endangered plants are determined and listed by the USDI Fish and Wildlife Service in 50 CFR §17 (available online at: <http://endangered.fws.gov/>). There are presently no reported records or suspected occurrences of Threatened or Endangered or Proposed plants on areas adjacent to the project area, including the Rio Grande National Forest and the San Isabel National Forest.

On the GMUG, the Colorado hookless cactus (*Sclerocactus glaucus*) is listed as Threatened by the USFWS. This cactus only occurs on the Grand Mesa area of the GMUG, far to the northwest of the project and in very different climate and habitat. The Cochetopa Hills project is located on the Gunnison portion of the GMUG, at much higher elevations than the habitat where this cactus occurs. As a result, for this species consultation with the USFWS is not required.

On the GMUG the De Beque phacelia (*Phacelia submutica*) is listed as Threatened by the USFWS. This annual plant only occurs on two members of the Wasatch Formation, on the Grand Mesa National Forest near the town of De Beque. This plant only occurs below 6,300 ft. elevation in that area, far to the northwest of the project and in very different climate and habitat, and the Wasatch Formation does not occur anywhere near the project area. As a result, for this species consultation with the USFWS is not required.

According to the Colorado Natural Heritage Program (Colorado Natural Heritage Program 2013), USDI Fish and Wildlife Service (USFWS 2012), the Colorado Rare Plant Field Guide (2013) and Dr. Barry Johnston, Forest Botanist, there are no Threatened, Endangered, or Proposed plants found on the Gunnison Ranger District, nor on adjacent National Forests or land of other ownerships. Thus, Threatened, Endangered, and Proposed plant species will not be considered for further analysis and there is no need for consultation with the U. S. Fish and Wildlife Service.

### **Forest Service Sensitive Plant Species**

Forest Service Sensitive plant species are those plants identified by the Regional Forester (USDA Forest Service 2005-2013) for which population viability is a concern. Forest Service Sensitive species are managed so that Forest Service actions ensure that these species do not become threatened or endangered (Forest Service Manual 2670.22). See Table 42 for a list of Forest Service Sensitive plant species found on the Gunnison Ranger District and adjacent lands, and justification for including them for further analysis.

Table 42. Forest Service Sensitive Plant Species Found on the Gunnison Ranger District and Surrounding Lands. Rarity status is given for each species as a global (G) and state (S) ranking based on NatureServe (2013) conservation status ranks.\*

Scientific Name	Common Name	Status Ranking*	Habitat	Suitable habitat present?	Discussion	Carry Forward for Analysis?
<i>Aliciella sedifolia</i>	stonecrop gilia	G1/S1	High alpine, on white volcanic ash with little to very little vegetation	No	Known locations are in the alpine to the west of the project area. The project area is below the known elevational range of this species, and does not provide suitable habitat.	No
<i>Astragalus microcymbus</i>	skiff milkvetch	G1/S1	Open Wyoming big sagebrush stands, on Precambrian gneiss and granite. 7,800-8,300'	No	Known locations are elevationally below project area, in different geology and different sagebrush (mountain big sagebrush).	No
<i>Botrychium lineare</i>	narrowleaf grapefern	G2/S1	Historically disturbed areas in the subalpine zone, usually in rocky or coarse-textured soils; meadows, fen-like seeps, gravelly roadsides	Possible	Known to occur in the north and east ends of the Gunnison Ranger District. There is potentially suitable habitat for this species present in the project area.	Yes
<i>Botrychium paradoxum</i>	peculiar moonwort	Not ranked	Alpine or subalpine open rocky or grassy sites above 10,500' elevation.	Possible	Only known to occur in the far north end of the district. There is potentially suitable habitat for this species present in the project area.	Yes
<i>Braya glabella</i>	arctic braya	G5T/S1	Alpine on calcareous gravelly soils, 12,000-13,000' elevation.	No	The project area is far below the known elevational range of this species, in very different climate and geological setting, and does not provide suitable habitat.	No
<i>Carex diandra</i>	lesser panicled sedge	G5/S1	Fens, wetlands, subalpine 9,000-10,500' elevation.	Possible	Not known to occur in this planning area and not found in field surveys.	Yes
<i>Drosera rotundifolia</i>	round leaf sundew	G5/S2	Fens, floating peat mats with <i>Sphagnum</i> moss, 9,100-10,000' elevation.	No	Not known to occur in this planning area and not found during previous surveys. Known occurrence is at the north end of the district in an acid fen. No suitable habitat present in the project area.	No
<i>Eriophorum altaicum</i> var. <i>neogaeum</i>	Altai cottongrass	G4T/S2	Fens, wetlands, 9,500-14,000' elevation.	Possible	Not known to occur in this planning area and not found during field surveys.	Yes

Scientific Name	Common Name	Status Ranking*	Habitat	Suitable habitat present?	Discussion	Carry Forward for Analysis?
<i>Eriophorum chamissonis</i>	Chamisso's cottongrass	G5/S1	Fens, wetlands, 9,500-14,000' elevation.	Possible	Not known to occur in this planning area and not found during field surveys.	<b>Yes</b>
<i>Eriophorum gracile</i>	slender cotton grass	G5/S2	Sedge meadows, fens, floating peat mats, saturated soil to shallow water, 8,100-12,000' elevation.	Yes	Not known to occur in this planning area and not found during field surveys.	<b>Yes</b>
<i>Kobresia simpliciuscula</i>	simple bog sedge	G5/S2	Calcareous fens with hummocks, alpine or subalpine, 9,500' elevation.	No	Not known to occur in this area and not found during field surveys in 2008, 2009 and 2012. No suitable habitat present in project area.	<b>No</b>
<i>Machaeranthera coloradoensis</i>	Colorado tansy-aster	G2/S2	Gravelly places in mountain parks, ponderosa pine stands, dry tundra, sandstone or limestone, 8,500-12,500' elevation.	Yes	16 subpopulations of 7 occurrences previously known or found during project-specific surveys within the project area.	<b>Yes</b>
<i>Neoparrya (Aletes) lithophila</i>	rock-loving neoparrya	G3/S3	Cliffs and breaks of volcanic tuffs, up to 8,700 ft	No	Occurs 8-10 miles east of the project area, but in a different, dryer climate and about 1,000 ft lower in elevation.	<b>No</b>
<i>Sphagnum angustifolium</i>	sphagnum moss	G5/S2	Iron fens or wetlands, 9,000-11,500' elevation.	No	Not known from this planning area. Known from the La Garita Wilderness. No new populations found for during field surveys. No suitable habitat present in the project area.	<b>No</b>

\*NatureServe Conservation Status Ranks (Natural Heritage Ranks), see Specialist Report appendices for NatureServe Ranks.

In the proposed treatment areas, there are approximately 8100 acres of coniferous forest, 950 acres of aspen stands, 70 acres of aspen with a conifer component, 70 acres of sagebrush shrubland, 2,500 acres of mountain grassland, and 175 acres of riparian vegetation. Of these vegetation types, mountain grassland is suitable habitat for the Forest Service Sensitive (FSS) species Colorado tansy-aster. Riparian vegetation is suitable habitat for the Forest Service Sensitive species lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, slender cottongrass, and simple bog sedge. Potential suitable habitat for Forest Service Sensitive species within the project area is summarized in Table 43.

Table 43. Summary of Habitats Proposed for Treatment and Potential FSS Plants in the Cochetopa Hills Project Area.

Vegetation type	Acres	Potential TESP species	Proposed activity
Mountain grassland	2,462	Colorado tansy-aster	Prescribed burn, road reconstruction, gravel pit
Riparian vegetation	174	Lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, Slender cottongrass	Some road maintenance, road crossings
Fens (a subset of riparian vegetation)	1	Lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, Slender cottongrass, and Sphagnum moss	None
Openings within forest (including roads)	200	Narrowleaf grapefern Peculiar moonwort	Reconstruction, motorized traffic, equipment staging

Alternative 1 proposes 5,897 acres of prescribed burn, and Alternative 2 proposes 7,336 acres. 1,754 acres of the prescribed burning are proposed in Douglas fir-ponderosa pine forest and in aspen stands where there are no known FSS plant species, nor suitable habitat. Alternative 2 includes some additional mixed conifer management burning for a total of 7,336 acres of prescribed burn. However, the majority of the habitats proposed for burning are 4,143 acres of range burn, predominantly in open mountain grasslands. These open habitats provide habitat for Colorado tansy-aster. There is also a proposed pit site located in an open gravelly habitat, with potentially suitable habitat for Colorado tansy-aster.

The riparian vegetation within the project area includes a number of wetlands, including at least two fens. The FSS species lesser panicled sedge (*Carex diandra*), Altai cottongrass (*Eriophorum altaicum* var. *neogaeum*), Chamisso's cottongrass (*Eriophorum chamissonis*), slender cottongrass, (*Eriophorum gracile*) and sphagnum moss (*Sphagnum angustifolium*) can all occur in wetlands and especially fens. No

mechanical treatments are proposed within wetlands, however some are adjacent to roads or treatment units, or downstream from proposed activity.

Both alternatives require roads to access treatment units and to transport equipment and forest products. Alternative 1 utilizes 119 miles and Alternative 2 utilizes 97 miles of haul road. Additionally, Alternative 1 proposes 55 miles of roadwork and Alternative 2 proposes 35 miles (Table 41). Roads create disturbance and openings in forest canopies, which can create habitat for some FSS plant species along their edges in pullouts or landings. Historically disturbed areas such as road edges or old landings within the aspen, spruce-fir, lodgepole, and cool-moist mixed conifer cover types in alpine and subalpine zones could provide potential habitat for narrowleaf grapefern (*Botrychium lineare*) or peculiar moonwort (*Botrychium paradoxum*).

In Alternative 1, the 5,960 acres of mechanical treatments range from conifer thinning through group selections, patch cuts, and overstory removal to clearcuts and aspen coppice treatments. The affected area is comprised of seven major forest types, listed by decreasing abundance within the project area: lodgepole, cool-moist mixed conifer, aspen, spruce-fir (often with an aspen component), bristlecone pine, warm-dry mixed conifer, and ponderosa pine at lower elevations. Most of the spruce-fir/aspen and lodgepole forests have undergone past timber harvesting operations. Alternative 2 includes the same range of forested habitats, but 1,856 fewer acres of mechanical treatment and an additional 1,439 acres of mixed conifer burning. No Forest Service Sensitive plant species of the Gunnison Ranger District are known to occur beneath upland forested canopies, with the exception of the possibility of Colorado tansy-aster (*Machaeranthera coloradoensis*) in open ponderosa pine forest (Table 42 and Table 43) and narrowleaf grapefern (*Botrychium lineare*) and peculiar moonwort (*Botrychium paradoxum*) in old road beds in mesic sites in conifer forests.

Other activities that have potentially affected the baseline conditions for sensitive plant species in the project area include fire suppression, grazing, roads and recreation. Fire suppression has impacted the vegetation of the project area since the early 1900's and may have decreased potential FSS species habitat, as most of the FSS species being analyzed in this document prefer open areas. Livestock grazing has been ongoing in the Cochetopa Hills area since the 1870's. Grazing has affected mainly the mountain grassland habitats of Colorado tansy-aster, and wetland habitats. Its past effects on Forest Service sensitive species of Cochetopa Hills are unknown. Past use of much higher stock numbers over a longer season with minimal management may have affected some populations of these FSS species. A Colorado tansy-aster occurrence in Colorado was evaluated to be resilient to continual long-term grazing, although the habitat itself is little grazed because of low cover (Johnston 2002). Grazing use has been looked at within the area and is not currently known to be affecting any sensitive species. The Continental Divide trail and a network of both open and closed roads occur in the Cochetopa Hills project area. Construction and use of roads for recreation, timber hauling, and general administrative use has potentially altered hydrologic functioning which could have affected historic, or current occurrences of wetland species including lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass and slender cottongrass. There have also likely been impacts to Colorado tansy aster from trampling, crushing, or removal of individuals in the past from road and trail construction, use and

maintenance. These disturbances may have affected the vigor of the occurrences that occur near roads and trails (see the Botany Specialist Report for more information).

### Field Surveys

Field reconnaissance for the proposed Cochetopa Hills Vegetation Management Project was conducted August 16-21, 2013. Surveys were mainly focused along project roads, particularly where they intercepted wetlands or crossed known rare plant habitats or occurrences, although a variety of habitats were sampled. Wetlands that looked like they could be affected by project activities were also targeted. A floristic list was not attempted for this project due to time constraints. Skiff milkvetch (*Astragalus microcymbus*) and rock-loving neoparrya (*Neoparrya lithophila*) were not found in the project area, and were determined to not have suitable habitat, since they occupy habitats in different, dryer and warmer, climates. These species were dropped from further consideration based on field reconnaissance.

Colorado tansy-aster (*Machaeranthera coloradoensis*) was the only plant species found in the project area during field searches. There are seven previously known occurrences (Colorado Natural Heritage Program 2013) and one new occurrence of Colorado tansy-aster (analyzed as 16 subpopulations because some occurrence numbers contained multiple subpopulations) within the project planning area.

Neither narrowleaf grapefern nor peculiar moonwort were found during field reconnaissance, though suitable habitat was not targeted during surveys. No Forest Service Sensitive plant species were found in the two fens or in any of the other wetlands. Although no individuals were observed, based on potentially suitable habitat, the following Forest Service Sensitive plant species have potential suitable habitat within the project area, and impacts to suitable habitat will be considered in the effects analysis:

- *Botrychium lineare* (narrowleaf grapefern): *Forest Service Sensitive*.
- *Botrychium paradoxum* (peculiar moonwort): *Forest Service Sensitive*.
- *Carex diandra* (lesser panicled sedge): *Forest Service Sensitive*.
- *Eriophorum altaicum* var. *neogaeum* (whitebristle cottongrass): *Forest Service Sensitive*.
- *Eriophorum chamissonis* (Chamisso's cottongrass): *Forest Service Sensitive*.
- *Eriophorum gracile* (slender cottongrass): *Forest Service Sensitive*.
- *Machaeranthera coloradoensis* (Colorado tansy-aster): *Forest Service Sensitive*.

### 3.10.2. Direct and Indirect Effects, Botany – Alternatives 1 and 2

#### Direct Effects

Under both alternatives, there could be direct effects to Colorado tansy-aster from road reconstruction and hauling. Approximately 650 Colorado tansy-aster plants are growing directly in roadbeds proposed for major reconstruction under both alternatives. Major reconstruction could include widening the road prism, vegetation clearing, installing drainage structures and suitable water crossings, and applying road surfacing. Scraping and reconstructing these roads would directly

impact Colorado tansy-aster plants growing in road beds. Individual plants could also be adversely impacted by being repeatedly driven on or parked on. The result would likely be loss of the plants growing in road beds subject to improvement, and a few plants would have reduced vigor or mortality in parking areas. Alternative 1 would impact more populations of Colorado tansy-aster than Alternative 2 (Table 44). However, the following project design criteria will limit the impacts to Colorado tansy-aster under both alternatives.

- Minimize use on roads with known Colorado tansy-aster sites.
- Remove roads from reconstruction activities where Colorado tansy-aster occurs in the current road prism.
- Minimize reconstruction width where Colorado tansy-aster is known to occur next to roads.

Table 44. Comparison of direct effects to Colorado tansy-aster between action Alternatives, based on 16 subpopulations of 8 occurrences within the project area.

Comparison criteria	Alt 1	Alt 2
No. subpopulations affected by roadwork	4 (25% <sup>*</sup> )	1 (6%)
Estimated number individuals affected by roadwork	170 (15%)	40 (4%)
No. populations along roads potentially used for project	9	9
No. populations in or near mechanical treatment units	4 (25%)	4 (25%)
No. populations in burn units	5 (31%)	5 (31%)

<sup>\*</sup>Percentage of occurrences affected in project area.

There are no Colorado tansy-aster occurrences located within mechanical treatment units, however a few are adjacent to mechanical treatment units or along access roads to them under both alternatives. There are grasslands in units 30, 43 and 53, where Colorado tansy-aster occurs. If these areas were used as areas to park or stage equipment adjacent to mechanical treatment units, individuals could be adversely impacted. The following design criterion will mitigate effects from equipment staging or parking:

- Locate staging and parking areas away from Colorado tansy-aster occurrences.

Because there are four sites of Colorado tansy-aster occurring in three units proposed for prescribed fire (range burn), there could be direct effects to plants due to burning. There has been no research on the effects of fire specifically on Colorado tansy-aster, though it is a deep rooted perennial with the potential to have some resilience (resprouting) to fire with low soil heating. During field reconnaissance, it was noted that in the open gravelly habitats where Colorado tansy-aster occurred in range burn units, there was not much fuel load present to carry a fire, certainly not to heat the soil to a lethal temperature. Because Colorado tansy-aster predominantly grows in areas within the project that have low fuel loads where resulting low-temperature fires may not kill deep-rooted perennials such as Colorado tansy-aster, impacts to individuals would likely be limited (Beatty et al. 2004). In the event that a fire was sustained in a Colorado tansy-aster population, effects would depend on fire severity and some individuals may be damaged or killed. Implementation of the following design criterion will help avoid damage to populations of Colorado tansy-aster from prescribed fire:



- During prescribed fire operations, locate ignitions and other fuel treatment activities away from Colorado tansy-aster occurrences.

Fire may have historically played a role in maintaining the open habitats favored by Colorado tansy-aster (Beatty et al. 2004). Prescribed fire could have a beneficial effect on Colorado tansy-aster by helping to maintain or increase suitable habitat, by reducing competition from shrubs, tree seedlings and tall grasses (Beatty et al. 2004).

Under Alternative 3, existing conditions would be expected to continue. There are no data on population trends for Colorado tansy-aster (Beatty et al. 2004). Individual Colorado tansy-aster plants growing in roadbeds could still be adversely impacted by ongoing vehicle traffic or routine road maintenance. However, there may be a preference for growing in lightly disturbed roadbeds (AMSET field observations, 2013), the current level of disturbance in roads may not affect Colorado tansy-aster. Livestock grazing is another ongoing activity in Colorado tansy-aster habitat. The effects of grazing on Colorado tansy-aster are probably minimal because it is apparently unpalatable to livestock and prefers habitats that are sparsely vegetated and rocky, which are not preferred for grazing (Beatty et al. 2004).

### Other Forest Service Sensitive Species

For other Forest Service Sensitive species, there is no difference in effects between Alternative 1 and Alternative 2. The following Forest Service Sensitive species, though not found or known to occur in the project area, still have the possibility of occurring in this project area: narrowleaf grapefern, peculiar moonwort, lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, and slender cottongrass.

Lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, and slender cottongrass are all obligate wetland species (Culver and Lemly 2013). With the implementation of design criteria to avoid any ground disturbance in wetlands and riparian areas and to avoid altering wetland hydrologic regimes through project activities such as road building, direct impacts to any possible occurrences of Forest Service Sensitive wetland species would be avoided.

The *Botrychium* species narrowleaf grapefern and peculiar moonwort are found to grow outside of wetlands or riparian areas. The habitats for these two species are open areas with low or no canopy cover, often where past disturbance has occurred, such as closed roads or regenerating roadside pullouts. Temporary opening of closed roads or staging heavy equipment on populations could potentially affect these species if they were present in the project area. The following design criterion would minimize potential impact to these *Botrychium* species:

- Proposed landings and staging areas in potential habitat for *Botrychium lineare* or *B. paradoxum* will be designed and marked on the ground only after they have been surveyed for *Botrychium* by a qualified botanist in the proper season, so that occurrences of these species can be avoided.

Under Alternative 3, the No Action Alternative, there would be no direct effects to any of the species analyzed: narrowleaf grapefern, peculiar moonwort, lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, and slender cottongrass.

**Indirect Effects**

Indirect effects to Forest Service Sensitive species could result from project activity due to increases of invasive plants competing with Forest Service Sensitive plants. Canada thistle (*Breca arvense*)<sup>2</sup> and cheatgrass (*Anisantha tectorum*) were the most common invasive non-native plants in the project area, but both of these were infrequently encountered, perhaps due to the dry, cold climate of the project area. Vehicles or heavy equipment could serve as vectors to transport invasive plant propagules within the project area. Invasive plant species are likely to respond favorably to openings and nutrient availability present in postfire conditions, especially in more mesic habitats (Carpenter and others 2000, Stohlgren 2002). Wetlands and disturbed or burned areas adjacent to roads are the most susceptible to invasive plant invasion, especially when these two conditions combine. Therefore, Forest Service Sensitive species located along roadsides (such as narrowleaf grapefern and peculiar moonwort), in roadside wetlands or in roadside burned areas (such as Colorado tansy-aster), could be indirectly adversely affected by the introduction of invasive plants resulting from project activities.

All areas where roads were adjacent to wetlands within the project area were surveyed in August 2013, and no Forest Service Sensitive wetland species were found along project roads, so it is unlikely that they would be affected by invasive species due to this project. Colorado tansy-aster habitat could be somewhat vulnerable to cheatgrass invasion because some of it is located along roads in proposed prescribed burns. Existing element occurrence records corroborate this and do not indicate a problem with invasive species at Colorado tansy-aster sites (Beatty et al. 2004). Project design criteria address this concern with invasive plant prevention and control measures (see Non-Native Invasive Plants Report).

Forest Service Sensitive wetland species, which tend to have specific hydrologic habitat requirements, could be indirectly impacted by changes to hydrological processes resulting from roadwork. With the implementation of design criteria to avoid any ground disturbance in wetlands and riparian areas and to avoid altering wetland hydrologic regimes through project activities such as road building, indirect impacts to any possible occurrences of Forest Service Sensitive wetland species would be avoided.

Indirect effects could arise from changes in canopy cover of associated vegetation due to removal of overstory trees. A decrease in canopy cover may temporarily create habitat for narrowleaf grapefern, peculiar moonwort and Colorado tansy-aster by increasing sunlight. Creation of temporary habitat could be beneficial to individuals, but transient habitat seems marginally beneficial on a population level.

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<sup>2</sup> Plant species nomenclature follows Weber and Wittmann 2012.

### 3.10.3. Cumulative Effects, Botany – Alternatives 1 and 2

“Cumulative effects are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action” (50 CFR 402.02)<sup>3</sup>.

Two cumulative effects, county road maintenance and global climate change, were identified with the potential to add to the effects of the proposed action alternatives (Alternatives 1 and 2). There will be no cumulative effects for Alternative 3, as there are no actions resulting in effects.

County road maintenance was identified as a potential cumulative effect for Colorado tansy aster. There are three occurrences identified along county maintained roads. County road maintenance could result in additional impacts to individuals such as crushing or removal from road maintenance equipment. This would act synergistically with the proposed action to add to the potential for decreased vigor and mortality of individuals, but is not anticipated to extirpate any of the occurrences as they are dispersed both along the road where impacts could occur, and adjacent to the road where no impacts are anticipated.

Global climate change could add stress to Forest Service Sensitive species populations. Within the next century, average temperatures are projected to increase and precipitation is projected to decrease in some of the interior areas of North America (Watson et al. 2001), which will affect plant community composition. Colorado tansy-aster apparently has the ability to tolerate somewhat stressful environments, exist at a range of elevations, and grow in a variety of habitats, which may help the species persist (Beatty et al. 2004), although it could be affected in Cochetopa Hills where it grows at relatively low (non-alpine) elevations. Many of the Forest Service Sensitive wetland species are Pleistocene relicts disjunct from cooler habitats already at the edge of their range, so if they were present climate change would likely add stress to them. However, this project is unlikely to affect their wetland habitats, so cumulative effects to them from this project are unlikely.

#### **Alternative 1: Proposed Action**

With the implementation of the following project design criteria, implementing Alternative 1 may adversely impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability for *Machaeranthera coloradoensis* (Colorado tansy-aster), *Botrychium lineare* (narrowleaf grapefern), and *Botrychium paradoxum* (peculiar moonwort).

It was also determined that implementing Alternative 1 will have no effect on *Carex diandra* (lesser panicled sedge), *Eriophorum altaicum* (Altai cottongrass), *Eriophorum chamissonis* (Chamisso's cottongrass), and *Eriophorum gracile* (slender cottongrass).

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<sup>3</sup> Cumulative effects according to Endangered Species Act regulations (as quoted above) are different from those according to National Environmental Policy Act regulations: “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7).

**Alternative 2: Economic Viability**

Forest Service botanists determined that implementing Alternative 2 may adversely impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability for Colorado tansy-aster, narrowleaf grapefern, and peculiar moonwort.

It was also determined that implementing Alternative 1 will have no effect on lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, and slender cottongrass.

**Alternative 3: No Action**

It was determined that Alternative 3 will have no effect on Colorado tansy-aster, lesser panicled sedge, Altai cottongrass, Chamisso's cottongrass, slender cottongrass, narrowleaf grapefern, and peculiar moonwort.

Please refer to Appendix B for all applicable design criteria.

**3.11. Invasive Plants****3.11.1. *Existing Conditions – Invasive Plants***

The Cochetopa Hills project area is composed of a variety of vegetation types, including coniferous forest, aspen stands, mountain shrublands, mountain grasslands, sagebrush shrubland, riparian areas, roadsides and openings within the forest. The Grand Mesa, Uncompahgre and Gunnison Forest Plan Revision (USDA 2006) assessed the risk of invasibility of vegetation cover types of the Gunnison Basin.

The degree of risk is qualitatively described as low, moderate or high. Low risk means that there is a negligible chance that there will be an increase in either risk of spread, or a negligible or imperceptible increase in infestation. Moderate risk means that there is a factor that is likely to either spread an infestation, or have a perceptible change in the infestation abundance and distribution. High risk means that there is a factor or an anticipated response by an infestation that will be substantial, and result in landscape scale effects.

In general, vulnerability decreases from high at lower elevations to very low at high elevations (which are mainly located in wilderness areas). Vegetation along major drainages and more open vegetation types were observed to have higher vulnerability. Spruce/fir, high elevation lodgepole pine and bare alpine cover types have a very low risk of invasion. Lodgepole pine, spruce/fir and aspen at moderately high elevations have a low risk. Grass/forb, lodgepole pine, and spruce/fir at moderate elevations have a moderate risk. Grass/forb, sagebrush and willow at lower elevations have a high vulnerability rating. Grass/forb and bare ground at lower elevations have a very high vulnerability, though this may be reduced by various abiotic conditions (eg. precipitation, nutrient availability).

Riparian zones are known to be more vulnerable to incursion by invasive plants than adjacent upland sites (Stohlgren and Chong 2002). Stohlgren and Chong (2002) found that mixed conifer forests with

sparse understory vegetation tend to be less invaded than adjacent canopy gaps, aspen stands, and montane meadows. However, they found no difference in vulnerability between grazed and ungrazed sites. Any site is vulnerable to invasion if light, water and nitrogen are available (Stohlgren and Chong 2002). Future potential non-project conditions that could increase habitat vulnerability are openings or soil fertility resulting from severe wildfire or beetle damage to trees, and disturbed habitat from construction causing loss of soil and native vegetation.

Roads are the most important habitat to consider when evaluating invasive plants because they create areas of localized habitat that is maintained at an early seral stage, which results in high vulnerability to invasive species. Similarly, other highly disturbed or early seral habitat such as construction sites, trails, campgrounds or landings have a high vulnerability. The Cochetopa Hills analysis area has an extensive road and trail system, which increases its inherent vulnerability.

The factors that affect the inherent habitat vulnerability for the Cochetopa Hills project area are mainly the presence of riparian areas and roads. Riparian habitat combined with presence of roads results in these localized areas being highly vulnerable to invasion. This vulnerability is tempered by a large component of the project area, the coniferous forests, having low vulnerability, especially where canopy cover is high. However, current forest conditions resulting from a century of fire suppression put higher-density stands at risk for high-intensity wildfire, which would increase habitat vulnerability to invasive plant infestation. The open grasslands have low to moderate vulnerability depending on the substrate and species composition. Overall, there is a low to moderate risk for invasion based on habitat vulnerability.

### **Non-project Invasive Plant Vectors**

Invasive plant infestations ensue from the introduction of invasive plant seeds or other propagules into an area. These propagules arrive in an area by an array of methods, or vectors. Vehicles that have been in infestations elsewhere, humans or other animals carrying or defecating seeds, contaminated livestock feed, water, and wind can all transport invasive plant propagules to a new site.

Vehicular traffic is by far the most frequent vector for invasive plant introduction, evidenced by the pattern of infestations being concentrated along roads. The transportation system of the Cochetopa Hills project area provides routes for movement of invasive plant propagules within as well as from outside the area. Recreational vehicles and maintenance equipment introduce and move propagules. Minor existing vectors include livestock, hikers on the Continental Divide or Colorado Trails, other recreationalists such as hunters, fishermen and campers, native animals such as birds, and wind. Future vectors include vehicles and equipment from routine maintenance and other projects (such as an upcoming project to address the spruce beetle epidemic, which would salvage-harvest spruce forests) or an increase in recreational activity as the local population expands.

Existing invasive plant infestations are expected to expand on their own, due to their inherent invasive nature, if they are not actively treated.

The risk from existing non-project vectors is low to moderate and due mainly to vehicular traffic, both recreational and official, throughout the project area.

### Invasive Plants In or Near the Project Area

There are a total of 38 known infestations of invasive plant occurrences within and adjacent to (on roads associated with project activities) the Cochetopa Hills project area. The invasive plants known from the Cochetopa Hills project area are black henbane (*Hyoscyamus niger*), Canada thistle (*Cirsium arvense*), corn chamomile (*Anthemis arvensis*), yellow toadflax (*Linaria vulgaris*), cheatgrass (*Bromus tectorum*), prickly Russian thistle (*Salsola tragus*), and herb sophia (*Descurainia sophia*, or flaxweed) (Table 44). All of these species with the addition of Russian knapweed (*Acroptilon repens*) are known from roads utilized for project activities. Canada thistle, cheatgrass, herb sophia and prickly Russian thistle infestations within the project area were all observed during field reconnaissance in August 2013. Corn chamomile, yellow toadflax, Russian knapweed and black henbane are previously known records and were not relocated in the project area in August 2013 field surveys (USDA 2006, 2008).

Invasive plants in and adjacent to the project area (Table 44) are concentrated along the state and county paved and major gravel roads, and on Forest Service roads in the northern part of the project area. The primary invasive species and the only state-listed noxious weed species that were found off the main roads of the project area were Canada thistle, cheatgrass and herb sophia<sup>4</sup>. Other sources indicate that black henbane, corn chamomile, and yellow toadflax are previously known from sites along state and county roads within the project area or access roads to the project area (USDA 2006 and 2008). None of these infestations were relocated during August 2013 surveys, presumably due to prior treatment efforts. Similarly, two occurrences of Russian knapweed have been previously reported from State Highway 114 just outside of the project area (USDA 2008) but were not observed in August 2013. Additional invasive species of concern found within the analysis area are herb sophia and prickly Russian thistle (*Salsola tragus*, or tumbleweed).

Table 44. Summary of Invasive Plant Species Found in the Cochetopa Hills Project Area and along Roads Associated with Project Activity.

Common name	Scientific Name (Name in Local Flora*)	State List	Total No. sites	No. sites within project planning area	No. sites along haul roads outside of planning area
Black henbane	<i>Hyoscyamus niger</i>	B	7	3	4
Canada thistle	<i>Cirsium arvense</i> ( <i>Breca arvensis</i> )	B	18	12	6
Corn chamomile	<i>Anthemis arvensis</i>	B	1	1	0
Russian knapweed	<i>Acroptilon repens</i>	B	2	0	2
Yellow toadflax	<i>Linaria vulgaris</i>	B	2	1	1

<sup>4</sup> several sources (e.g. NPS 2003) also cite herb sophia, found along a Forest Service road, as being on the state list but it is no longer on the state list.

Cheatgrass	<i>Bromus tectorum</i> ( <i>Anisantha tectorum</i> )	C	4	4	0
Herb sophia	<i>Descurainia sophia</i>		2	2	0
Prickly Russian thistle	<i>Salsola tragus</i> ( <i>Salsola collina</i> )		2	1	1

\*. Weber and Wittmann 2012.

The Grand Mesa, Uncompahgre and Gunnison National Forests utilize the Colorado state noxious weed list to guide management on invasive plants, and additionally manage for invasive species of local concern. The State of Colorado Department of Agriculture ranks invasive plant species by their priority for treatment (CDA 2013). “List A” species are high priority species designated by the State Agricultural Commissioner to be eradicated whenever they are found. “List B” species are species for which a management plan is developed to stop their spread, and management is generally prioritized. “List C” species are species for which the goal is to provide additional education, research and biological control resources to jurisdictions that choose to manage these species, generally because they are already widespread and eradication is not feasible. Management for C-listed species is determined at a local level.

### 3.11.2. Direct and Indirect Effects, Invasive Plants – Alternatives 1 and 2

A variety of timber harvest prescriptions as well as prescribed burns and roadwork is proposed for the Cochetopa Hills (Table 45). Alternative 1 is the preferred alternative, Alternative 2 is the economic alternative, and Alternative 3 is the no action alternative, in which there would be no effect from project implementation. In Alternative 1, the 5,960 acres of mechanical treatments range from conifer thinning through group selections, patch cuts, and overstory removal to clearcuts and aspen coppice treatments. Alternative 2 includes the same range of mechanical treatments, but 1,856 fewer acres. Both alternatives require roads to access treatment units and to transport equipment and forest products. Alternative 1 utilizes 119 miles and Alternative 2 utilizes 97 miles of haul road. Additionally, Alternative 1 proposes 55 miles of roadwork and Alternative 2 proposes 35 miles (Table 45). Alternative 1 proposes 5,897 acres of prescribed burn, and Alternative 2 includes some additional mixed conifer burning for a total of 7,336 acres of prescribed burn. However, the majority of the habitats proposed for burning are 4,143 acres of range burn, predominantly in open mountain grasslands.

Table 45. Comparisons of Actions and Outputs of Alternatives for the Cochetopa Hills Vegetation Management Project.

Mechanical vs. Burn Treatments	Alternative		Invasive plants known to occur
	Alt 1 (acres)	Alt 2 (acres)	
Mechanical (timber harvest)	5,960	4,104	Canada thistle
Prescribed burn	5,897	7,336	Cheatgrass, Canada thistle
Transportation System	Alternative		
	Alt 1 (miles)	Alt 2 (miles)	
Total haul roads	118.8	96.7	Black henbane, Canada thistle, cheatgrass, corn chamomile, herb Sophia, prickly Russian thistle, Russian knapweed, yellow toadflax.
Road segments to decommission (due to re-route)	2.5	0.7	<i>none</i>
Roads to decommission (due to Gunnison Travel Plan)	4.6	2.3	<i>none</i>
New re-routed/extended roads	4.7	1.4	<i>none</i>
Roads needing major reconstruction	14.6	2.7	<i>none</i>
Roads needing minor reconstruction	17.8	16.6	Canada thistle
Roads to open (admin. closures)	11.2	11.2	Canada thistle

### Habitat Alterations Expected as a Result of Implementation of Alternatives

Areas where vegetative cover is disturbed and bare soil becomes exposed are most susceptible to invasive plant invasions (USDA 2006). An increase in available sunlight is also a factor in increasing susceptibility to invasion by invasive plants. Both mechanical and burn treatments will increase habitat vulnerability by creating ground disturbance and more light. Mechanical timber harvest activities, including clearcuts, overstory removal, group selections, coppice treatments, thinning, and the associated creation of skid trails and landings will all increase habitat vulnerability by decreasing canopy cover, increasing available sunlight and creating ground disturbance. Road reconstruction will increase habitat vulnerability by creating more areas of bare ground. Opening closed roads and building new roads makes sites more accessible to invasion of invasive plants via vectors. Burn treatments will create a more open habitat with increased nutrient availability generally favored by invasive plants.

Standard USFS contracting procedures such as retaining native vegetation to the extent possible and re-seeding disturbed areas and minimizing disturbance from heavy equipment in natural parks will help ameliorate an increase in habitat vulnerability from project activities.

There are two cheatgrass infestations of particular concern. One is located in unit 131, and another is near burn unit 151, which are both prescribed burn units under both alternatives. Burning could



increase habitat vulnerability by providing suitable habitat for the increase of the cheatgrass infestations. Excluding areas with known cheatgrass infestations from burn activity will help reduce increased vulnerability of adjacent habitat.

Overall, alternatives 1 and 2 do not differ significantly as far as risk of increasing invasive plants, but Alternative 1 creates a little more susceptible habitat (Table 45). Alternative 1 creates 1856 more acres of potentially susceptible habitat through timber harvest treatments, while Alternative 2 creates 1,439 more acres of susceptible habitat through burning in mixed conifer forest. However, the units that differ between the alternatives are not located near invasive plant infestations. The additional acres of mixed conifer burning in Alternative 2 are located in the southern part of the project area, where no invasive plants are known, and are not adjacent to any known infestations. Similarly, the additional acres of mechanical treatment in Alternative 1 are not located adjacent to any known infestations. Alternative 1 is therefore expected to have only a slightly higher risk of increasing habitat vulnerability than Alternative 2, due to slightly more overall creation of vulnerable habitat.

### **Increased Vectors Expected as a Result of Project Implementation**

The implementation of both action alternatives will increase vectors for invasive plant spread. Project road reconstruction will increase vectors from machinery, and increased traffic from hauling will increase vectors along haul roads. Of most concern are activities adjacent to current infestations. These sites are addressed individually in the Specialist Report, and summarized below (Table 46). The implementation of project design criteria will lessen the increase in vectors due to project activity.

Under the no action alternative, existing invasive plant infestations would be expected to expand on their own if they are not actively treated, due to the capability of their propagules to spread naturally, which helps confer their invasiveness.

The majority of infestations are located along hauling routes, on County-maintained roads. An assessment of the risk of spread of these infestations is in part dependent on the assumption that the County will continue to treat infestations along State and County roads. For the majority of these infestations, the existing (“no action”) risk of spread is low based on observations (2013), patterns of limited dispersal and establishment, and negative monitoring results of known sites of the B-listed plant sites, suggesting that they have been being treated effectively. For cheatgrass, the risk of spread is low to moderate, higher than the other invasive plant species along haul roads, due to the difficulty in controlling seed set and seed dispersal in this species. For prickly Russian thistle, the risk of spread is low to moderate because it is not prioritized for treatment; however it seems to confine itself to a one- to two-meter strip of disturbance along the roads. Both alternatives will increase the risk of spread of all infestations located along haul routes somewhat by increasing traffic.

Infestations occurring adjacent to treatment areas generally have a higher increased risk of spread from project activities. This includes some Canada thistle and some cheatgrass infestations. Specifically, two Canada thistle infestations are located in and along the closed road 874.1J in unit 129, which is designated as a road to re-open and reconstruct to haul specs under both alternatives. This has a high risk of spreading the infestation by creating ground disturbance and transporting propagules on machinery. Treatment of infestations prior to and during project implementation and cleaning

equipment after working in infestations will decrease the risk of spreading Canada thistle from this location. Other Canada thistle infestations along Forest Road 7874874 could be spread especially if the sites were used as landings or staging areas. Treatment, equipment cleaning and not locating landings and staging areas near known infestations will help decrease the risk of spread from these infestations.

One herb sophia site is located along Forest Service Road 579, which accesses the proposed pit location. Under both alternatives there would probably be a substantial increase in vehicular vectors on road 7848848 due to hauling from the pit proposed on that road, and therefore an increase in the risk of spread. Treatment of the infestation prior to project implementation will help decrease the risk of spread from this site. The other herb sophia site is located at a proposed roadwork site where a culvert needs to be replaced. The risk that propagules from this site could be spread to other sites through machinery is high if the machinery is not properly cleaned. Equipment cleaning following work in areas with known infestations and will help decrease the risk of spreading this infestation.

Workers implementing the project would also pose a minimal increase in vectors because invasive plant propagules could be carried on their clothing or tools under either alternative. It is possible that contaminated fill could spread invasive plant propagules, although the pit location is free of invasive plants.

Alternative 1 would have 13.1 more miles of roadwork and 22.1 more miles of haul roads than Alternative 2 (Table 45). Therefore, vectors would be increased along 35 miles by implementation of Alternative 1 due to a larger increase in area of haul roads and road reconstruction. However, because most of the roads that differ between alternatives are not located near existing infestations, the difference in risk between the action alternatives will be negligible.

The overall risk of spread from increased vectors would increase from low to moderate under the no action alternative to moderate under both action alternatives. Please refer to Appendix B for applicable design criteria.

### 3.11.3. Cumulative Effects, Invasive Plants – Alternatives 1 and 2

There is an anticipated increase in risk of spread of invasive plants with implementation of Alternative 1 or 2.

Table 46. Summary of Risk of Invasive Plant Spread by Species<sup>1</sup> with Project Design Criteria Incorporated

Common Name	No Occurrences <sup>5</sup>	Risk of spread		
		No Action	Alt 1	Alt 2
Black henbane	7	low	low-moderate	low-moderate
Canada thistle	1	low-moderate	moderate	moderate

<sup>5</sup> Please refer to the specialist report for individual occurrences.

Common Name	No Occurrences <sup>5</sup>	Risk of spread		
		No Action	Alt 1	Alt 2
Canada thistle	3	low	moderate	moderate
Canada thistle	12	low	low	low
Cheatgrass	1	low-moderate	low-moderate	low-moderate
Cheatgrass	3	low-moderate	moderate	moderate
Corn chamomile	1	low	low-moderate	low-moderate
Herb sophia	2	low	moderate	moderate
Prickly Russian thistle	2	low-moderate	low-moderate	low-moderate
Russian knapweed	1	low	low-moderate	low-moderate
Russian knapweed	1	low	low	low
Yellow toadflax	2	low	low	low
<b>TOTAL</b>	<b>38</b>	<b>low</b>	<b>low-moderate</b>	<b>low-moderate</b>

The introduction and spread of invasive plants in the Cochetopa Hills Vegetation Management Project is due to three main factors: existing infestations, habitat vulnerability, and vectors. While existing infestations are the most likely source of invasive plant propagules, there is also a risk of introduction of new invasive plants into the project area, which is due to the inherent habitat vulnerability in the project area and project related vectors.

Both overall habitat vulnerability and vectors will increase from low to moderate under the no action alternative to moderate under both action alternatives. Alternative 2 would increase both habitat vulnerability and vectors slightly more than Alternative 1; however this difference isn't substantial enough to increase the overall risk rating. The main cause of increased habitat vulnerability is increased openings and ground disturbance generated by project activities. The main activities that would cause an increase in vectors are project machinery carrying propagules, an increase in vehicular traffic from hauling, and an increase in total roads for vectors to travel on. Project design criteria that require washing equipment and revegetation help moderate the increase in habitat vulnerability. Treating known infestations and vehicle washing will help moderate the increase in vectors.

The average risk of spread of existing infestations within the project would increase from low with no action (Alternative 3), to low-to-moderate under both action alternatives, with project design criteria incorporated (Table 46). Invasive plant species with the highest risk of spread in the project area under the action alternatives are Canada thistle and cheatgrass, due to their locations proximal to project

activities and the difficulty in controlling their spread, and the wet habitat of some of the Canada thistle locations. Project design criteria were developed to address these risks, and include equipment washing, treatment of known infestations, and excluding known cheatgrass sites from burning. These design criteria will mitigate the risk of spread to moderate for cheatgrass and Canada thistle.

Overall, both action alternatives have a moderate risk of increasing the spread of invasive plants as a result of habitat alteration and vector increase. Combined with the risk of spread for individual species and infestations, which is low to moderate with project design criteria, the cumulative risk from implementation of either action alternative is low to moderate.

### 3.12. Recreation Resources

#### 3.12.1. *Existing Conditions – Recreation*

##### **General Recreation**

A variety of recreational activities take place in the Cochetopa Hills project area. Both dispersed and developed recreation activities are common by visitors to the GMUG. Executive Order 12862 directs the Forest Service to collect information about the quantity and quality of recreation. As measured by the National Visitor Use Monitor Survey, annual visitation to the GMUG is 2,286,000. A National Forest Visit is defined as the entry of one person onto the Forest in order to recreate for an unspecified period of time. During one visit to the Forest, a person may make multiple site visits. Those visits are further broken down by type in Table 47.

Table 47: GMUG Visits by Visit Type (1,000s)

<b>Total Estimated Site Visits</b>	<b>2,488</b>
Day Use Developed Sites	1,053
Overnight Use Developed Sites	38
General Forest Area Visits	1,303
Designated Wilderness Visits	94

Source: GMUG Visitor Use Report, 2009

Popular activities for visitors include OHV use, mountain biking, hiking, backpacking, horseback riding, big game hunting, firewood gathering, and dispersed camping. Big hunting during the Fall and Winter months is a major draw to the area and provides important economic stimulus to local communities. Overall, visitors to the GMUG for recreational purposes are highly satisfied with their experience. Table 48 reports the percent of survey respondents that were satisfied with their visit. The vast majority of visitors reported that they were satisfied with their experience, as well as satisfied with their feeling of safety in developed and undeveloped sites and wilderness areas.

Table 48: GMUG Visitors Reporting to be Satisfied with their Experience

Satisfaction Element	Satisfied Survey Respondents (%)		
	Developed Sites	Undeveloped Areas	Designated Wilderness
<b>Developed Facilities</b>	87	89	99
<b>Access</b>	84	86	88
<b>Services</b>	83	76	80
<b>Feeling of Safety</b>	95	93	95

Source: GMUG Visitor Use Report, 2009

As the population in Colorado continues to grow, it is likely that the GMUG will see increased demand for recreational services. The GMUG is well positioned to continue to provide for quality recreational experiences; however vegetation management activities should be designed to minimize impacts to recreational user groups and provide for a safe environment.

#### **Recreation on the Continental Divide National Scenic Trail (CDNST)**

The existing trail that passes through the project area follows a series of connecting roads, trails, and 'two-track' routes. The CDNST is classified under the Visual Management System (VMS) as a sensitivity level 1, where foreground (areas within  $\frac{1}{4}$  to  $\frac{1}{2}$  mile from the observer) should be managed with a Retention or Partial Retention Visual Quality Objective (VQO). Definitions of these are:

- Retention – Alterations made by people are not visually evident to the casual forest visitor
- Partial Retention – Alterations made by people must appear subordinate within the surrounding natural appearing landscape.

Landscape viewing is subdivided into distance zones. For the visual analysis these distance zones and their related concern levels are defined as:

- Immediate Foreground: 0 feet to 300 feet (concern level 1) – This area receives the highest scrutiny
- Foreground: 300 feet to one-half mile (concern level 1) – In this area individual forms dominate (for example individual trees) and other sensory messages are received (for example birds singing)
- Middleground: one-half mile to four miles (concern level 2 – In this area form, texture, and color remain dominant; human activities (such as timber harvest) may cause contrasting features if there are vantage points

The southern portion of the existing route within the planning area is in an open treeless environment, affording the user with extensive views of the surrounding country. Predominant views, where vegetation is open enough to allow views from the existing trail, look up from a range of low elevations down to 9,400 feet, at the Continental Divide in the foreground to middleground to the southeast, as tree covered hills, and then across extended mountain grasslands in the foreground to middle ground to the northwest towards Cochetopa and or Razor Dome in the background. As the trail progresses into the timber, views are reduced to the surrounding forested environment, with openings and vistas along roadsides, creeks and meadows occurring infrequently along the trail. Scenic Integrity Objectives (high,

moderate and low) for the area seen from the current trail are consistent with roaded natural settings, and are met by the current trail alignment at all distance zones.

Table 49 describes where trail segments align along existing roads that either transect or adjoin proposed treatment units, or roads that would be used for hauling. All proposed treatments and road use would be considered in the foreground and middleground as measured from the existing trail.

Table 49. CDNST Units and Roads (na = not applicable)

Unit	Road	Alternative 1	Alternative 2	Road closure status
49	864.2A	0.14	na	open
54	864	0.22	0.22	open
56	864	0.11	0.11	open
56	787.2A	0.17	0.17	open
64	787	0.08	0.08	open
67	787	0.02	na	open
75	597	0.16	na	open
91		0.18	0.18	no road
93	878	0.02	0.02	currently closed, decommission
96		0.1	0.1	no road
103	785	0.18	0.18	open
149	864.2A	0.47	0.47	open
150	787.2A	0.71	0.71	open
155	787.2D	0.48	0.48	open
157	876	0.72	0.72	currently closed
157		0.22	0.22	no road
166	878.1C	0.04	0.04	currently closed
166		0.24	0.24	no road
153, 180	787.2D	1.1	1.1	open
96, 97	878.1C	0.26	0.26	currently closed
	876	1.7	1.7	currently closed
	878.1C	0.25	0.25	currently closed
	878	0.94	0.94	currently closed, decommission

Unit	Road	Alternative 1	Alternative 2	Road closure status
	597	1.62	1.62	open
	785	1.65	1.65	open
	787	1.51	1.51	open
	864	0.26	0.26	open
	787.2A	1.21	1.21	open
	787.2D	0.43	0.43	open
	864.2A	1.4	1.4	open
	County Rd 14	0.54	0.54	open
	State Highway 114	0.32	0.32	open

### *3.12.2. Direct and Indirect Effects, Recreation – Alternatives 1 and 2*

#### **Alternative 1: Proposed Action**

Under this alternative there would be a total of 5,960 acres of commercial and non-commercial mechanical treatments implemented along with 8,897 acres of prescribed burning. In addition to the vegetation management there would be a variety of treatments to the transportation system, including 4.7 miles of exiting system roads re-routed, 13.5 miles of reconstruction and 17.4 miles of maintenance activities to minor reconstruction.

#### **Alternative 2: Economic Viability**

This alternative was designed to maximize the economic benefits of this project. Commercial and non-commercial mechanical treatments would occur on 4,104 acres and prescribed burning on 7,336 acres. There would be fewer miles of treatments to the transportation system compared to Alternative 1, which would further improve the economic viability of the project in terms of monetary costs and benefits. The consequences of this alternative on recreational resources are expected to be the same as those reported in Alternative 1. Overall, this alternative is not expected to have any significant environmental impacts of recreation.

#### **Alternatives 1 and 2: General Recreation**

The primary consequences of these activities are visual effects from vegetation treatments and increased logging traffic and noise in treatment units. However, post-treatment conditions are expected to provide for better ecological conditions and greater public safety than under the existing conditions. Although impacts to recreation may occur incrementally during implementation, it is expected that the long-term conditions would support greater stand diversity and improved recreational opportunities. During treatment phases it is likely that recreational activities will be transitioned to other locations within the region, and there will not be a net loss in recreational activity to the local economy. Overall,

the proposed action is not expected to have any significant environmental impacts to the recreation resource.

#### **Alternatives 1 and 2: Continental Divide National Scenic Trail**

The effects of the two action alternatives are similar, differing only in that Alternative 2 does not include units 49, 67 and 75, and 0.32 miles of trail along roads that are adjacent to these units. Four units (91, 96, 157 and 166) common to both Alternatives have the trail passing through the unit, while the remainders of the units have the trail adjacent to the units along existing roads. Both alternatives propose to decommission a segment of road 878, removing the appearance of a road and retaining only a trail tread.

Table 50. CDNST, Summary of Miles Affected

<b>Trails on Road</b>	<b>Alt 1</b>	<b>Alt 2</b>
Currently closed	3.93	3.93
Open	12.78	12.46
<b>Total Miles of Trails on Roads</b>	<b>16.71</b>	<b>16.39</b>
Trail miles adjacent to units (included in Trails on Road)	5.62	5.30
Trail miles within units	0.74	0.74
<b>Total Trail Miles Affected</b>	<b>17.45</b>	<b>17.13</b>

Both alternatives propose to open 3.93 miles of currently closed roads that the trail follows for access to harvest units. This would reduce the recreational experience along these routes during operations. Approximately 17.45 miles (Alternative 1) and 17.13 miles (Alternative 2) of trails on existing roads (including the closed roads) would be used for timber hauling and harvest access, or have treatment units adjacent (prescribed burning units). Increased traffic associated with the harvest and burning activities would further degrade the recreation experience slightly; however, as the majority of these roads are currently open for vehicle traffic, the effects would be limited to the time treatment activities would occur, and diminish to pre-project levels after activities are completed.

Treatment units adjacent to and/or overlapping the trail would implement the design features identified in the Forest Plan (design features listed below). Implementing these design criteria will provide some mitigation to the visual impacts of the project. The changes in vegetation structure and composition will be apparent for the first few years, and then will diminish over time as new vegetation grows and begins to moderate the appearance.

Both action alternatives are consistent with Forest Plan standards and guidelines with the implementation of specified design criteria.



**Alternative 3: No Action**

Under the No Action alternative no treatments would be implemented and no direct impacts would occur to recreational resources. Recreation trends would be expected to continue as under the existing conditions. However, over time if no treatments were to be implemented there could be further deterioration of conditions and increased safety risk associated with hazardous trees. This could impact recreational activities; however, the degree of those impacts is not quantifiable. It is expected that there would not be noticeable impacts to recreation under the No Action alternative.

**3.12.3. Cumulative Effects, Recreation – Alternatives 1 and 2**

Past, present and reasonably foreseeable activities in the analysis area include commercial and non-commercial vegetation management activities, fire prevention and suppression, firewood gathering, wildlife mitigation, recreation and special use permit activities, and watershed improvement projects.

Past, present and future timber sales in this area will continue to cause some level of visual impacts to the recreational users. Measures to mitigate visual impacts will help to reduce the cumulative effects of these timber sales. Outreach and education of visitors on the benefits of timber harvest activities to domestic wood supply, vegetation management, biomass needs and rural economic development would help inform them of forest management objectives. Additionally, logging traffic and noise associated with other vegetation management activities would add to the impacts of this project. However, it is still anticipated that the cumulative effects will be minimal and not have significant impact on recreational resources.

Cumulative effects to the Continental Divide National Scenic Trail include noise, increased logging traffic and visual impacts where the trail is adjacent to or passing through units. Noise and logging traffic associated with treatment activities would be limited to the time treatment activities occur. Visual impacts to the recreation experience on the CDNST would have the longest lasting effects. Visual impacts will be greatest during, immediately following, and after the first few years of treatment, but will lessen over time with the growth of new vegetation. Implementing the following design criteria will help mitigate the effects. Both action alternatives are consistent with Forest Plan standards and guidelines with the implementation of specified design criteria.

**Continental Divide National Scenic Trail Design Criteria**

There are four pages of specific standards and guidelines in the current Forest Plan applicable to visual resource management. In the case of a timber sale in an area with a Visual Quality Objective (VQO) of Retention and Partial Retention, the following standards and guidelines would apply in the Foreground area (VMGC 1 and 2):

- (a) Manage to retain a minimum of 10% of the larger old-growth Ponderosa Pine, Spruce-fir, and Douglas fir in VMGC 1 and 2.

- (b) Clearcutting units must not expose more than 15% of the seen area for a travel corridor in VMGC 1.
- (c) Clearcutting units must not expose more than 20% of the seen area for a travel corridor in VMGC 2 and 3.
- (e) Develop corridor or viewshed reports for all travel corridors in VMGC 1, 2, and 3 before starting ground disturbing activities.
- (f) Cutting units must not dominate natural patterns of form, line, color, and texture in VMGC 1, 2, 3, 4 and 5.
- (h) Manage to retain or improve diversity of understory size and species in VMGC 1 and 2.
- (i) All ground disturbances to be returned to natural appearances where feasible in all VMGC's.
- (j) Stump height to be held to the minimum possible in visible areas in VMGC 1 and 2.
- (k) Provide diversity of species and age classes in VMGC 2, 3, 4, 5, 6 and 7.
- (l) Landings are to be located outside seen areas or rehabilitated after timber sale in VMGC 1, 2, 3, 4 and 5. Snags for cavities are to be located to conform with natural vegetation patterns in VMGC 1, 2, 3.
- (m) Gravel, borrow and stockpile areas to be excluded from seen areas in VMGC 1 and 2.
- (n) Roads must not dominate natural patterns of form, line, color and texture within clearcut areas one year after cutting in VMGC 1, 2, 3, 4 and 5.

### 3.13. Economic Costs and Opportunities

#### *3.13.1. Existing Conditions – Economics*

The study area for the economic analysis is defined as Saguache County, Colorado. In general, the study area has a limited economic base; important sectors include logging and wood products, and recreation and tourism. The Cochetopa Hills Project is designed to provide positive economic stimulus for the local economy while improving ecological conditions and visitor safety in the area. This section provides an evaluation of the existing conditions of the study area, including basic demographics, employment and personal income. Such factors can influence the social and economic effects of land management activities. The existing condition also provides a baseline for comparison of the impacts reported in the environmental consequences section.

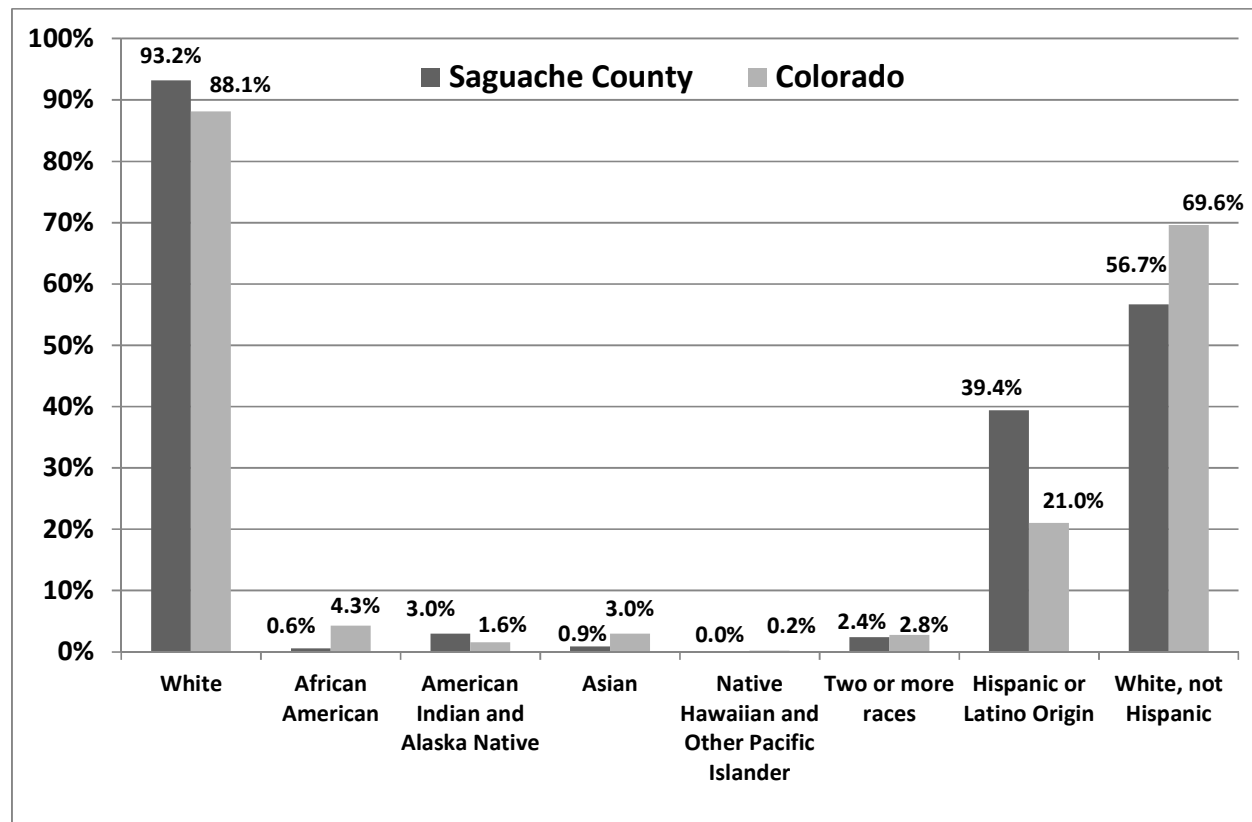
The population in 2012 was 6,304 (Table 51). Between 2000 and 2012 Saguache County experienced a modest growth rate of 7 percent. However, this growth rate is much slower than that at the state level which was 21% during the same time period. Generally, the population of Saguache County is older

than that at the state level; 16 percent is age 65 or older in Saguache County versus 11 percent in Colorado.

Table 51. Population and Growth Rate			
	2000	2012	% Change
Saguache County	5,917	6,304	7%
Colorado	4,301,261	5,187,582	21%
Source: <a href="http://www.census.gov">www.census.gov</a>			

Figure 16 reports the ethnic distribution for the study area. According to Census definitions, Hispanic or Latino origin may be of any race; therefore, summing the ethnic distribution in an area often results in a sum of greater than 100%. The majority of individuals in the study area are White. The ethnic distribution is similar to that at the state level, except for Hispanic Origin. Hispanic Origin accounts for 39 percent of Saguache County's population versus 21 percent of the State. A more detailed discussion of project impacts on minority populations is provided in the Environmental Justice Section below.

Figure 16. Ethnicity for Saguache County and Colorado ([www.census.gov](http://www.census.gov))

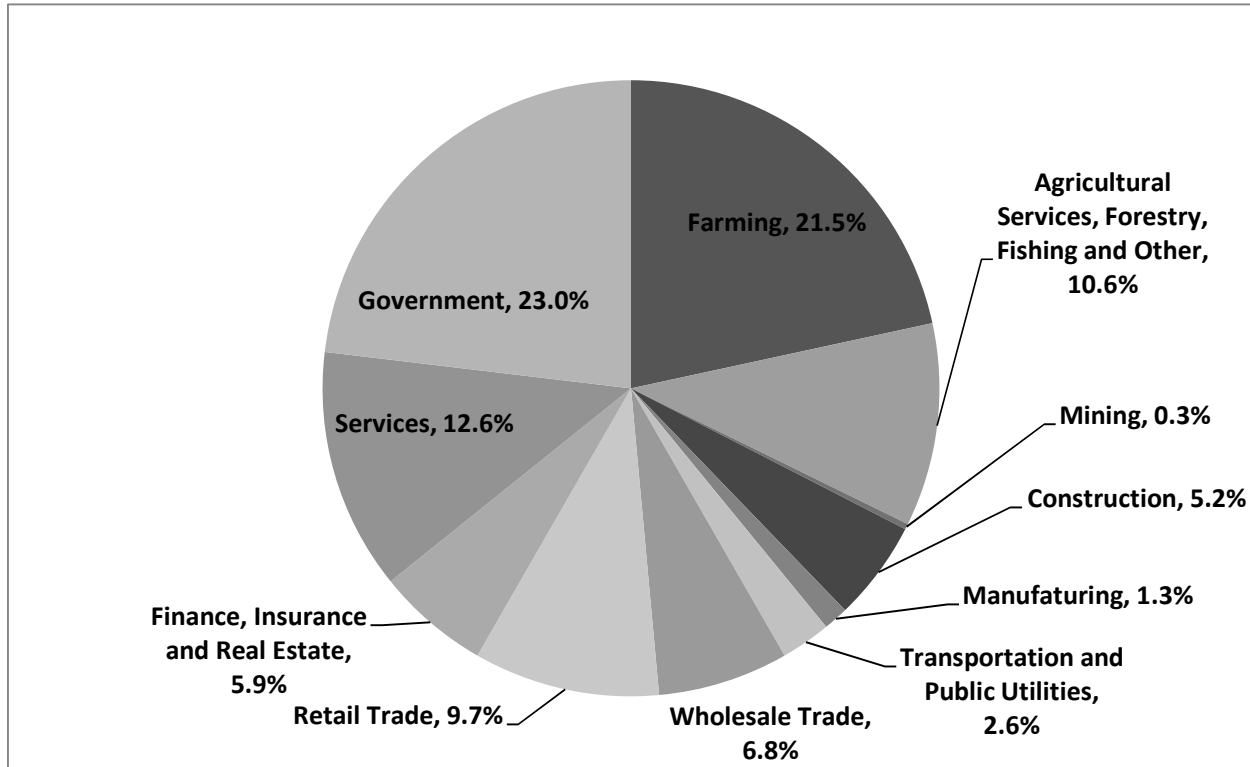


An important indicator for the economic base of Saguache County is employment by sector. Figure 17 breaks down the proportion of jobs by primary economic sector. Government employment (including

Federal, State and Local levels) is the largest employer in the local economy, followed by Farming. Saguache County has high natural amenity values that attract visitors to the area. An abundance of outdoor recreational opportunities exist, many of which can be supported within the project area. Access to those types of activities can directly influence local economic conditions.

Figure 17. Saguache County Proportional Employment by Sector

Source: Headwaters Economics, 2012



In recent years many economic indicators for Saguache County have trended towards poorer conditions. The unemployment rate is one such indicator. Unemployment, for example, in April 2013 was at 8.9 percent, up from 3.7 percent in May 2007. Median incomes in Saguache County are low relative to the state level. According to the U.S. Census Bureau, the median annual household income for Saguache County from 2007 through 2011 was \$33,672 compared to \$57,685 for the state of Colorado. Further, the percentage of persons below the poverty level during the same time period was 25.3 percent in Saguache County and 12.5 percent in Colorado as a whole.

### Environmental Justice

As stated in Executive Order 12898, it is required that all federal actions consider the potential of disproportionate effects on minority and low-income populations in the local region. The principals of Environmental Justice require agencies to address the equity and fairness implications associated with Federal land management actions. The Council on Environmental Quality (CEQ) (1997) provides the

following definition in order to provide guidance with the compliance of Environmental Justice requirements:

“Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis...”

According to the US Census data reported in Figure 16 above, it is suggested that the study area for the Cochetopa Hills Project has two minority populations could that meet the Environmental Justice criterion relative to the state population: American Indian and those of Hispanic Origin. Furthermore, the large percentage of persons below the poverty level relative to that of the state indicates that the low-income population of the county could meet the Environmental Justice criterion as a population of concern.

The Environmental Justice principles were considered in regards to the project activities. The proposed action and alternatives were reviewed to determine whether or not they could adversely impact minority and low-income populations. Economic impacts are expected to be negligible, and there is no reason to suspect that any will disproportionately affect minority and low income populations. The activities associated with the proposed action may support additional employment and income to the region; from which, minority and low-income populations may benefit.

### **Environmental Consequences**

This section analyzes the direct, indirect and cumulative effects of the Proposed Action on the economic environment. Effects are assessed relative to the baseline conditions reported in the Affected Environment Section above.

According to FSM 1970.62, the analysis should implement “techniques to develop the most efficient combination of activities for each decision unit within each alternative.” Given the information provided, financial efficiency measures are calculated in this analysis to provide a means of comparing the economic feasibility of the Proposed Action relative to the No Action alternative. A discussion of financial efficiency measures is reported in this document and paired with a qualitative assessment of the economic impacts that may not be quantified through monetary values.

#### *3.13.2. Direct and Indirect Effects, Economics – All Alternatives*

The economic analysis focuses on the financial efficiency associated with commercial harvest treatments. It does not determine if the sales are above or below cost, but compares the financial efficiency of each alternative. This financial efficiency analysis does not incorporate monetary values for all known market and non-market benefits and costs. Discussions specific to the timber industry focuses primarily on the State of Colorado.

Cost efficiency is a measure of how well inputs (activities) are used in a production process to produce a fixed set of outputs. It is only a partial measure because not all benefits and costs to society can be quantified. Revenues from sawtimber have been assigned dollar values based on current markets and are quantifiable. Other resources such as watershed health, riparian health, wildlife abundance and diversity, long-term habitat improvement, social benefits, and scenic resources cannot easily be assigned dollar values. This financial efficiency analysis does not consider ecosystem services or non-market goods that are not required at the project level by the NFMA.

*One financial analysis with three alternatives was run for the project. Table 52 summarizes the cost-benefit and Present Net Value results from Quick-Silver.*

Table 52. Quick Silver Financial Analysis

Alternative	PV Benefits	PV-Costs	Benefit: Cost Ratio	Net Present Value	Approx. Vol. Harvested (CCF)	Hazard Reduction Acres
Alternative 1	\$520,350.33	\$350,129.40	1.49	\$170,220.93	26,568	11,857
Alternative 2	\$368,327.37	\$610,633.81	0.6	-\$242,305.85	21,789	11,440
Alternative 3	\$0	\$0	0	\$0	0	0

#### **Alternative 1: Proposed Action**

When determining economic efficiency, all costs and benefits associated with the management activities should be taken into account. This includes those that may not directly be monetized. Assigning quantitative values to those variables is outside the scope of this analysis. Non-market benefits could include improved ecosystem health, improved safety, more recreation opportunities, greater scenic values, increase in wildlife, reduced threat of fire, and a variety other effects not accounted for in the market place. Thus, financial indicators considered as part of the commercial timber sale should be measured along with any other social and ecological impacts associated with the management activities. Additionally, implementation of the commercial timber sale and restoration activities would generate jobs and income for local communities. This additional economic stimulus would have a ripple effect through the economy. The additional spending caused by these activities would further support jobs in non-timber related sectors such as retail.

In general the activities associated with the Proposed Action would generate positive economic stimulus in the project area. However, the effects of that stimulus are not expected to significantly impact economic conditions.

Alternative 1 would generate a benefit-to-cost ratio of 1.49 with the proposed harvest and artificial regeneration under this alternative, since the benefit-to-cost is greater than 1.0, this alternative is financially above cost to the Forest Service. The net present value of this alternative is \$170,220.93. The present value benefit of the forest products being offered under this alternative is \$520,350.33; these

benefits include only sawtimber and products other than logs (POL) volume sold in commercial timber sales or stewardship contracts. Personal use firewood is not included although this would be a revenue benefit to the government. The present value cost associated with implementing this alternative is \$350,129.40; these costs include timber sale preparation, road work needed to access the sale areas, timber sale administration, all logging costs, slash disposal, and tree planting. Under this alternative, approximately 26,568 CCF of sawtimber could be offered.

### **Alternative 2: Economic Viability**

The environmental consequences to the economic environment of Alternative 2 would be the same as those reported in Alternative 1 with additional measures to improve the economic viability of the project. Additional measures would be taken to maximize the financial benefits under this alternative, so that the net dollar cost of the project would be minimized. This alternative is not anticipated to significantly impact economic conditions in the project area.

Alternative 2 generates a benefit-to-cost ratio of 0.6. The present value benefit of the forest products offered under this alternative is \$368,327.37, and the present value cost associated with offering this product is \$610,633.31; these costs include timber sale preparation, road work needed to access the sale areas, timber sale administration, all logging costs, slash disposal, and tree planting. Under this alternative, approximately 21,789 CCF of sawtimber could be offered. Alternative 2 has a lower benefit-to-cost ratio than alternative 1, and a smaller net present value.

### **Alternative 3: No Action**

Under the No Action alternative there would be no treatments implemented as a result of this project. There would be no removal of timber through a commercial timber sale or any other actions as a result of the decision. Because no activities would occur under the No Action, there would be no direct effects. Furthermore, no estimate exists that allows for a determination of changes in local economic conditions in terms of indirect effects. Under the No Action, the project area would be left to natural means of changing conditions. There would be no efforts for restoration or improving safety conditions as a direct result of this project. Other efforts may occur or be ongoing, but are not affected by the decision on this project.

#### *3.13.3. Cumulative Effects, Economics – Alternatives 1 and 2*

Cumulative effects of the Cochetopa Hills Project include the total change in economic conditions that would result from the specifications under this alternative in conjunction with the direct and indirect effects of other present and reasonably foreseeable activities. For example, any environmental change as a result of this alternative would be in addition to other resource management actions occurring simultaneously. Estimates of the impacts associated with other vegetation management projects are

not readily available; however, on the margin, it is expected that they will support additional jobs and income in a similar fashion to this Project. In general, the study area has low population density, a large proportion of the population is in the working age group, and unemployment rates are elevated. Thus, new jobs could be filled by unemployed residents. This should contribute to reduced unemployment rates and increased resident incomes. Cumulative impacts should continue to positively influence employment and income conditions. Due to the higher unemployment rates, it is not expected that those effects would change household migration patterns.

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## 6. AGENCIES, ORGANIZATIONS AND PERSONS CONSULTED

Listed below are those major agencies, organizations, and individuals who were contacted through scoping or through consultation. A complete list scoping contact is available in the project record at the Gunnison Ranger District office.

### **Federal Agencies**

U.S. Fish and Wildlife Service, Grand Junction, CO  
USDI, Bureau of Land Management, Gunnison Field Office, Gunnison, CO  
USDA Forest Service, Saguache Ranger District, Saguache, CO  
USDA Forest Service, Gunnison Ranger District, Gunnison, CO  
USDI National Park Service, Gunnison, CO  
USDI Bureau of Land Management, Lakewood, CO

### **State Agencies**

Colorado Parks and Wildlife, Gunnison, CO  
Colorado State Forest Service, Gunnison, CO

### **Local/Tribal Government**

Saguache County Commissioners, Saguache, CO  
Northern Ute Tribe, Fort Duchene, UT

### **Individuals**

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Guinn J.W., Trustee, Gradford, TX  
Ward Ranches, Inc., Saguache  
Trust of Lucky Joseph Ford, Gunnison, CO  
Snyder Properties LLC, Norwood, CO  
Coleman, James Timothy, Saguache  
The Lucky 3, Inc. La Fayette, GA  
Guinn, J.W., Trustee, Gradford, TX  
Funk, Howards S., Gunnison  
Ward Ranches, Inc., Saguache  
Mt. Emmons Mining Co. Climax  
Dan Morse (HCCA), Crested Butte, CO  
Julie Feier (Western State College), Gunnison, CO  
Richard Drake (logger), Moffet CO  
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Senator Michael Bennet, Grand Junction, CO

**Businesses and Organizations**

Colorado Wild, Denver, CO  
The Colorado Trail Foundation, Golden, CO  
Wilderness Workshop, Carbondale, CO  
Rocky Mountain Recreation Initiative, Nederland, CO  
Center For Native Ecosystems, Denver, CO  
Rocky Mountain Chapter of Sierra Club, Boulder, CO  
Wild Connections, Associate Director, Florissant CO  
Colorado Timber Industry Association, Montrose, CO  
Delta Timber, Delta, CO  
High Country Citizens' Alliance, Crested Butte, CO  
Intermountain Forest Industry Association, Rapid City, SD  
Montrose Forest Products, LLC., Montrose, CO  
Mountain Valley Lumber, Saguache, CO  
Rocky Mountain Recreation Initiative, Nederland, CO  
Quarter-Circle Circle Ranch, Gunnison, CO  
Sierra Club, Rocky Mountain Chapter, Boulder, CO

## 7. GLOSSARY

**Administratively closed road:** National Forest System Road that is closed for public use, yet maintained as part of the National Forest Road System to facilitate access to private in-holdings or management activities.

**Age class:** Groups of trees or shrubs of approximately the same age.

**Best Management Practices (BMP):** Best Management Practices refer to Forest Service water quality and maintenance improvement measures that were developed in compliance with Section 208 of the Federal Clean Water Act, PL92-500, as amended.

**Canopy:** Upper layer or cover of branches and vegetation in a stand of trees.

**Continental Divide National Scenic Trial (CDNST):** The Continental Divide National Scenic Trail extends from the Canadian border in Montana to the Mexican border in New Mexico and is approximately 3,100 miles long. The original intent of the trail is to provide scenic, primitive hiking and horseback riding opportunities along the corridor, while conserving its natural, historic, and cultural resources. The 1985 CDNST Comprehensive Plan Amendment guides the Forest Service in the development and management of the trail.

**Clearcut:** Cutting all trees in an area to a minimum diameter.\*

**Conservation populations:** Conservation populations are those for which genetic analysis has found less than 10 percent non-native genes.

**Coppice:** Tree cutting method in which renewal of a newly cutover area depends primarily on vegetative reproduction like sprouting.\*

**Coppice regeneration:** Ability of certain hardwood species to regenerate by producing many new shoots from a cut stump.\*

**Ecological succession:** The orderly and predictable growth and replacement of plant species that normally occur over time; usually initiated by disturbance activities.

**Environmental Justice:** The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. (EPA, <http://www.epa.gov/environmentaljustice/>)

**Forest Plan:** The 1991 Grand Mesa, Uncompahgre and Gunnison National Forests Amended Land and Resource Management Plan (Forest Plan), is the programmatic document required by the rules implementing the Forest and Rangeland Renewable Resources Act of 1974 (RPA) as amended by the National Forest Management Act of 1976 (NFMA).

**Forest road/ National Forest System Road (NFSR):** Roads maintained by the Forest Service, usually used for Forest Service access to perform forest maintenance activities.

**Fuel break:** Wide strips of land 60 to 1,000 feet in width on which native vegetation has been modified so that fires burning into them can be more readily controlled.

**Gunnison Travel Management Plan:** This plan identifies approved travel routes and modes of acceptable travel, and reduces the miles of roads on NFS lands within the Gunnison Ranger District. The purpose is to create a more sustainable travel system while maintaining visitor and management access, in accordance with regulations 36 CFR Parts 212, 251, 261, and 295.

**Habitat Structural Stage (HSS):** The Habitat Structural Stage (HSS) is a vegetation classification system used to represent stand structure for landscape level analysis of forest condition and wildlife habitat quality.

**ID Team/Interdisciplinary Team:** A group of individuals from a variety of professional backgrounds and specializations who work together to solve a problem or develop a management plan.

**Inventoried Roadless Area (IRA):** Forest Service lands that have been identified and mapped in accordance with the Roadless Area Conservation Final Rule (the '2001 Roadless Rule'). Reference 36 Code of Federal Regulations, Part 294 and 66 Federal Register 3244-3272 (Jan. 12, 2001). The definition of a roadless area for the 2001 Roadless Rule included: undeveloped areas typically exceeding 5,000 acres that met the minimum criteria for wilderness consideration under the Wilderness Act and that were inventoried during the Forest Service's Roadless Area Review and Evaluation (RARE II) process, subsequent assessments, or forest planning. Low intensity underburn/Low intensity surface fire.

**Management Indicator Species (MIS):** any species of plant or animal that has been identified as a representative for a group of species with special habitat requirements.

**Map units (MUs):** The fundamental unit of soil mapping; units are named according to the dominant soils that they contain.

**Mechanical treatment/Mechanical harvest:** Cutting with mechanized equipment instead of by hand or power saw.

**National Environmental Policy Act (NEPA):** Signed into law on January 1, 1970, [42 U.S.C. 4321 et seq.] NEPA establishes national environmental policy and goals for protection, maintenance and enhancement of the environment and provides a process for federal agencies to follow when implementing these goals. The Act also establishes the Council on Environmental Quality (CEQ).

**National Forest System (NFS) Land:** Federal lands designated by Executive Order or statute as National Forests, National Grasslands or Purchase Units, or other lands under the administration of the Forest Service.

**Noxious Weeds:** Plant species designated as weeds by federal or state laws. Noxious weeds are generally aggressive and difficult to manage parasitic, and non-native.

**Patch cut:** Logging operations mapped for timber type and condition, but which do not include the entire stand.

**Potential Natural Vegetation (PNV):** The ultimate successional stage of a plant community under the current climatic regime.

**Precommercial thinning:** Cutting trees from a young stand that the remaining trees will have more room to grow to marketable size.\*

**Prescribed burn:** The controlled application of fire by a team of specialists under specific conditions to restore environments and achieve land management objectives.

**Rangeland:** land used for livestock grazing, usually open meadows.

**Regeneration:** The renewal of vegetation whether by natural or artificial means. Also, the new growth itself.

**Responsible Official:** The Forest Service employee who has the delegated authority to make a specific decision.

**Revegetation:** The reestablishment and development of a plant cover, either through natural processes or through management practices such as reseeding.

**Riparian areas:** The moist transition zone between the aquatic ecosystem and the relatively drier, terrestrial ecosystem. Land bordering a stream, lake or river, usually with distinctive plant species, soil types and topography.

**Scoping:** The process of obtaining public comments about proposed Federal actions to determine the range of issues to be addressed. Comments on the proposed action were solicited from members of the public, other public agencies, tribal governments, adjacent property owners, interest groups, and Forest Service specialists.

**Semi-primitive motorized recreation:** Opportunities such as snowmobiling, four-wheel driving, and motorcycling.

**Seral stages:** Age classes of plant life in a community. Stages of forest growth, usually labeled as early, mid, and late seral stages.

**Shelterwood seed step treatments:** Uniformly remove trees throughout the stand to create openings large enough to regenerate new trees. Trees to remove will include damaged, diseased, and suppressed trees that would not make good seed trees.

**Silvicultural Treatment:** A management practice that utilizes a method of tree culture, harvest, or replacement.

**Slash:** Fuels resulting from forest treatments, such as thinning or clearcutting, or from a storm or natural event. Slash usually consists of branches, logs, fallen trees, and uprooted stumps.

**SRLA (Southern Rockies Lynx Amendment):** The Southern Rockies Lynx Amendment was adopted in 2008 by the U.S. Forest Service Rocky Mountain Region to amend Forest Land and Resource Management Plans to better conserve Canada lynx in the area. The amendment applies to all eight Forest Plans in the Southern Rockies.

**Thinning:** A forest management treatment where individual trees are cut to reduce stand density

**Threatened and Endangered Species:** **Threatened species** are plants and animals that are likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**Endangered species** are those plants and animals that have become so rare they are in danger of becoming extinct. These species and their habitats are protected under the Endangered Species Act.

(<http://www.epa.gov/espp/index.html>)

**White Pine Blister Rust (WPBR):** An exotic, invasive fungus that will infect and kill white pine, including bristlecone pine trees.

8. APPENDIX A: MAPS

Map 1 - Project vicinity map

Map 2 - Alternative 1, proposed action (treatments and transportation)

Map 3 – Alternative 1, Planned haul routes

Map 4 – Alternative 2 (treatment units and transportation)

Map 5 – Alternative 2, Planned Haul Routes

9. APPENDIX B: DESIGN CRITERIA

10. APPENDIX C: RESPONSE TO COMMENTS (SCOPING)

**Note: All Appendices are located in the Appendices file on the GMUG website.**